



June 28, 2012

Ms. Janice Pinero  
Endangered Species Compliance Act Specialist  
Bureau of Reclamation  
Bay-Delta Office  
801 I Street, Suite 140  
Sacramento, CA 95814-2536  
[jpintero@usbr.gov](mailto:jpintero@usbr.gov)

**Via Email and First Class Mail**

Re: NEPA Review of Modifications to the Continued Long-Term Coordinated Operation of the CVP and SWP to Avoid Jeopardy and Adverse Habitat Modification of Multiple Listed Species

Dear Ms. Pinero:

On behalf of the undersigned organizations and our hundreds of thousands of members and activists in California, we offer these scoping comments on the Bureau of Reclamation's NEPA review of proposed modifications to CVP/SWP operations necessary to avoid jeopardy and adverse habitat modification to several threatened and endangered fish species.<sup>1</sup> Our comments

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<sup>1</sup> The undersigned groups appreciate the opportunity to submit these comments in response to the NOI prepared by Reclamation. However, we do not agree with the district court's determination that Reclamation's NEPA obligations are triggered by the agency's decision to comply with the biological opinions prepared by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. Our participation in this NEPA review does not indicate concurrence with that decision and should not be construed as such.

focus on foundational questions regarding the proposed action, baseline, and alternatives in light of the need for the Central Valley Project (CVP) and State Water Project (SWP) to modify their operations to better protect endangered and threatened fish species. We note that the most reliable and lasting approach to reducing conflicts between CVP/SWP operations and listed species is to recover those species (as all federal agencies are obligated to do under § 7(a)(1) of the ESA) and operate the CVP/SWP in a manner that is fully compatible with long-term ecosystem health. We believe such operations are entirely feasible, and should be the focus of Reclamation's NEPA review.

I. Both The Proposed Action and Baseline Should Incorporate the Existing BiOps and RPAs

Reclamation's Notice of Intent describes the proposed action as follows: "consider operational components of the 2008 USFWS and the 2009 NMFS Reasonable and Prudent Alternatives." 77 Fed. Reg. 18860. We agree that the Reasonable and Prudent Alternatives ("RPAs") in the 2008 delta smelt and 2009 salmonid biological opinions ("BiOps") provide the appropriate starting place for the CVP/SWP operations that define the proposed action. This approach is consistent with the district court's rulings, which directed Reclamation to conduct NEPA review on its decision to implement the RPAs.

However, it is also important to recognize that those RPAs are currently being implemented, have been in place for over three years, and will remain in place at least until the pending NEPA review and BiOp remand is complete. CVP/SWP operations according to the RPAs, therefore, also represent the baseline operations for analysis under NEPA.

Reclamation and DWR recently concluded in a similar context that operations pursuant to the RPAs in the 2008 and 2009 BiOps represent "existing conditions" for analysis. The February 2012 administrative draft EIS/EIR for the Bay Delta Conservation Plan explains that "[t]he Existing Conditions assumptions for the BDCP EIR/EIS will include existing facilities and ongoing programs that existed as of February 13, 2009 (publication date of the Notice of Preparation and Notice of Intent) that could affect or could be effected by implementation of the Proposed Project and alternatives." BDCP administrative draft EIS/EIR at 3D-3, Feb. 2012 (avail. at [http://baydeltaconservationplan.com/Libraries/Dynamic\\_Document\\_Library/EIR-EIS\\_Appendix\\_3D\\_Defining\\_Existing\\_Conditions\\_No\\_Action\\_Alt\\_No\\_Project\\_Alt\\_and\\_Cumulative\\_Impact\\_Conditions\\_2-29-12.sflb.ashx](http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/EIR-EIS_Appendix_3D_Defining_Existing_Conditions_No_Action_Alt_No_Project_Alt_and_Cumulative_Impact_Conditions_2-29-12.sflb.ashx)). Those ongoing programs include the 2008 delta smelt BiOp. *Id.* at 3D-107. The BDCP EIR/EIS also defines the 2009 salmonid BiOp as part of existing conditions, even though it was finalized after the February, 2009 publication date of the NOI (unlike the case here). *Id.* at 3D-105. The draft explains that:

For the purposes of the BDCP EIR/EIS, the Existing Conditions also includes the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Biological Opinion (NMFS BiOp) on the Long-Term Operations of the Central Valley Project and State Water Project (Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, Southern Distinct Population Segment of North American green sturgeon, and

Southern Resident killer whales.) The NMFS BiOp was issued on June 4, 2009 in response to a request issued in 2006 by U.S. Bureau of Reclamation (Reclamation) for reconsultation of a NMFS BiOp issued in 2004. Reclamation issued a revised biological assessment in August 2008, and a draft NMFS BiOp was issued for peer review on December 11, 2008. Although the NMFS BiOp was published following the NOP, most of the provisions were being discussed prior to the NOP. Therefore, the NMFS BiOp is included in the Existing Conditions.

Reclamation should similarly include the requirements of both BiOps in the baseline here.

II. Reclamation Should Define the Project Purpose Expansively and Consider a Wide Range of Alternatives

A. The 2008 Biological Assessment and Contractual Obligations Should Not Limit the Reasonable Range of Alternatives

Alternatives development is driven by identifying different approaches to achieving the same project purpose. Reclamation's NOI describes the purpose of the action as continuing the coordinated operations of the CVP and SWP "as described in the 2008 Biological Assessment (as modified)" in a manner that avoids jeopardy and adverse habitat modification of listed species and is consistent with law and other requirements, including "contractual obligations." 77 Fed. Reg. 18859. To the extent that Reclamation views either the 2008 Biological Assessment or contractual obligations as limiting the range of reasonable alternatives, we urge you to omit these qualifiers from the project purpose.

The 2008 Biological Assessment describes only one of several possible ways of operating the CVP and SWP in a coordinated manner and in compliance with legal and other obligations. Moreover, the operations described in the 2008 Biological Assessment would indisputably lead to jeopardy and adverse modification of critical habitat for numerous listed species, conflicting with one of the primary purposes of the project as described in the NOI.<sup>2</sup> Because numerous alternatives exist to operating the CVP and SWP as described in the 2008 Biological Assessment – alternatives that better meet the objectives of avoiding jeopardy and adverse habitat modification – Reclamation should not limit the range of alternatives analyzed under NEPA to those that comply with the 2008 Biological Assessment.

Similarly, Reclamation and DWR have signed long-term water delivery contracts for the CVP and SWP that far exceed the capacity of the Projects to meet on a regular basis, let alone in an environmentally sustainable manner. Full contract deliveries for both Projects have rarely, if ever, been made, and are based on invalid build-out assumptions, outdated land use assumptions,

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<sup>2</sup> While Judge Wanger found certain deficiencies in the 2008 and 2009 BiOps and remanded them back to the agencies to address those deficiencies, he upheld the basic conclusions of both BiOps, confirming that Project operations as proposed in the 2008 Biological Assessment would cause jeopardy and adverse habitat modification for several listed species.

and extremely favorable hydrology that occurs only very infrequently. Contract quantities are, therefore, unrealistic, and should not limit the range of reasonable alternative operating regimes.

In addition, contract “obligations” do not trump Reclamation’s duties to conserve threatened and endangered species and their critical habitats under the Endangered Species Act. As the court explained in *Pacific Coast Fed’n of Fishermen’s Assocs. v. Gutierrez*, “[a]s a top priority, the Bureau must “insure that actions authorized funded or carried out by [it] do not jeopardize the continued existence’ of a listed species,” even if doing so would require that the Bureau ‘alter ongoing projects in order to fulfill the goals of the Act.’” 606 F. Supp. 2d 1195, 1202 (E.D. Cal., 2008) (emphasis added) (quoting *TVA v. Hill*, 437 U.S. 153, 186 (1978)); see also *NRDC v. Kempthorne*, 2008 WL 5054115, \* 16 (E.D. Cal., Nov. 19, 2008) (shortage provisions in CVP water service contracts “prevent the Bureau from suffering any liability for curtailing deliveries ... when necessary to effectuate ESA purposes” and render the contracts “entirely defeasible if the ESA so requires”). Meeting contract quantity amounts is, therefore, neither a reasonable nor a legally-required objective.

#### B. Alternatives Should Consider Reclamation’s Non-ESA Environmental Obligations and Alternative Water Supplies

We urge Reclamation to formulate alternatives that analyze both the agency’s (and DWR’s) non-ESA environmental obligations, as well as ways that alternative water supplies could be used to alleviate or eliminate the impacts of reduced export water supplies.

##### 1. Alternatives Should Include Measures to Meet State and Federal Salmon Doubling Mandates

Numerous non-ESA environmental obligations apply to Reclamation that should cause it to modify Project operations in a manner that is more protective of the environment than the baseline RPAs. For example, the Central Valley Project Improvement Act directs DOI to develop and implement a program that makes “all reasonable efforts” to ensure and sustain on a long-term basis a doubling of the number of naturally produced anadromous fish in Central Valley rivers and streams, using the average levels attained during the period of 1967-1991 as the baseline. CVPIA § 3406(b)(1). The plan was due by 1995, and the doubling goal was to have been met by 2002. Section 3406(b)(2) directs DOI to “dedicate and manage” 800,000 acre-feet of CVP yield each year for the primary purpose of implementing the CVPIA’s restoration mandate. This dedicated yield may also be used “to assist” California in addressing Bay Delta water quality and “to help meet” the CVP’s ESA obligations. Section 3406(b)(1) directs DOI to use the (b)(2) water “as needed to achieve the goals of” the doubling program.

These statutory salmon doubling requirements have been reinforced by several judicial decisions and independent reviews. On January 23, 2004, the 9th Circuit issued a decision regarding CVPIA § 3406(b)(2), clarifying that:

The district court erred in concluding that Interior lacks discretion to refrain from crediting the amount of [CVP water] actually used for any (b)(2) purpose against the

designated 800,000 acre feet of Project yield. To hold otherwise would be to defeat the primary purpose for which the 800,000 acre feet were designated – fish, wildlife and habitat restoration.... If Interior were required to deduct some or all the water it uses for water quality and Endangered Species Act purposes from the (b)(2) dedication, the water needed for implementation of the Improvement Act’s restoration mandate could be relegated to a secondary role, or perhaps no role at all. *Such a scenario would directly conflict with the Interior’s mandate to give effect to the hierarchy of purposes established in Section 3406(b)(2).*

*Bay Institute of San Francisco v U.S.*, 87 Fed. Appx. 673, 639-640 (9th Cir. 2004) (emphasis added). In subsequent litigation, the 9<sup>th</sup> Circuit reaffirmed and substantially expanded upon its 2004 decision. See *San Luis & Delta Mendota Water Authority v U.S.*, 672 F.3d 676 (9th Cir. 2012). The 2012 decision explained that the CVPIA’s “restoration mandate” is distinct from the environmental protections provided for in other statutes, may not be subsumed by Reclamation’s separate duties under the ESA and other statutes, and may not be relegated to a secondary role. *Id.* at 705-7. The decision also clarified that Reclamation’s existing 2003 Guidance on b(2) implementation is invalid in some respects, *id.* at 708-9, and chastises the agency for failing to implement a more coherent approach and set of accounting procedures in the wake of the 2004 Ninth Circuit decision. Now, more than eight years after *Bay Institute*, Reclamation has yet to correct the flaws in its b(2) policy to allow it to effectively achieve the salmon doubling goal that Congress directed more than two decades ago.

In addition to these unambiguous mandates from the courts, in 2006, the U.S. Office of Management and Budget (OMB) raised questions about DOI’s failure to comply with the CVPIA’s salmon doubling mandate and recommended a comprehensive review. In 2008, Interior organized the review that resulted in the Listen to the River report. See “Listen to the River: An Independent Science Review of the CVPIA Fisheries Program” (December 2008). Listen to the River concludes that “[a]fter 16 years of implementation, the CVPIA anadromous fish program is not close to its stated doubling goal, nor has it solved the problems that led to the listing of several species of salmon and steelhead under the ESA.” The independent review additionally concluded that DOI’s program was unable to “attack the fundamental system-level problems or realize the greatest biological benefit in an effective way,” finding that the agencies: had not developed a proper conceptual foundation and framework for the program; had organized and managed the program in a compartmentalized way rather than an integrated, systematic and scientific way; had not addressed key fisheries problems at the systems level; had failed to prioritize and address effectively the problems in the Delta; and had substantially underutilized CVPIA authorities, especially with regard to water management and the issues in the Delta.

The Panel’s primary finding was that, although DOI has taken actions that have been beneficial, it bears substantial responsibility for continued salmon declines. It recommended that DOI approach the salmon doubling mandate with the “same zeal” it approaches its water supply mission and use the authority delegated to it by Congress accordingly.

This NEPA review provides an excellent opportunity for Reclamation to correct decades of failed implementation of the CVPIA's salmon doubling mandate and formulate alternative operations that will meet the mandate, focused as it is on ways to improve operations to avoid adverse impacts to fish species.<sup>3</sup> We urge Reclamation to seize the opportunity and correct this longstanding wrong.

2. Reclamation's Development of Alternatives and Impacts Analysis Should Consider the Availability of Existing and New Alternative Water Supplies

The water contractors that sued Reclamation to prompt this NEPA review focused almost exclusively on the impact of CVP/SWP water supply delivery reductions that they alleged were "caused" by RPA compliance. This focus is incorrect for a number of reasons, including the fact that CVP/SWP contractors are not entitled to receive water deliveries when that water is needed for threatened and endangered species protection. Moreover, as explained above, both Reclamation and DWR have numerous non-ESA environmental obligations that likely exceed the effect of RPA compliance on water supplies if properly implemented, including salmon doubling obligations, public trust requirements, California ESA obligations, Fish and Game Code § 5937 requirements to keep fish in good condition below dams, and more. While California needs to maintain an adequate water supply to meet the needs of a growing population and economy, water delivered from the CVP and SWP is a small portion of the total water supplies both used by and available to the State, and cannot and should not be viewed in isolation from other supplies available to meet the State's water supply needs and CVP/SWP contractors' water supply needs. We urge Reclamation to take a far more holistic view of the State's available and potential water supplies when considering alternative operational scenarios and assessing water supply impacts.

For example, Bulletin 160 published by DWR every three years identifies a large and growing supply of alternative water supply options available throughout the State and to a variety of water users. We have appended to these comments the "highlights" summary from the most recent 2009 bulletin 160. Attachment 1. It provides DWR's analysis of potential new water supplies available from a variety of improvements in agricultural and urban water use efficiency, recycled water, and improved groundwater management. Att. 1 at 18. We've also appended the State Water Resource Control Board's policy establishing goals for more stormwater capture and use in the State by 2020 and 2030. Attachment 2. Collectively, these documents from the State's water agencies identify the following range of potential new water supplies available to the State in the near term:

Agricultural water use efficiency:	0.1-1.0
Urban water use efficiency:	1.2-3.1
Groundwater:	0.5-2.0

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<sup>3</sup> A similar requirement exists in state law, and applies to DWR. Cal. Fish & Game Code § 6902; State Water Resources Control Board, *Water Quality Control Plan for the San Francisco Bay / Sacramento-San Joaquin Delta Estuary* (May 1995), 18, 28-29; State Water Resources Control Board, *Water Quality Control Plan for the San Francisco Bay / Sacramento-San Joaquin Delta Estuary* (2006), 14, 33-34.

Recycled water:	1.8-2.3
Urban stormwater:	<u>0.5-1.0</u>
Total:	4.1-9.4 MAF

Obviously, the potential to generate new water supplies from investing in these alternatives to CVP/SWP water supplies is enormous and dwarfs the alleged water supply impacts “caused” by operating the Projects in compliance with the ESA. In fact, even the conservative estimates above represent a potential nearly equal to the combined Delta exports of the CVP and SWP.

Moreover, Reclamation and DWR have the ability to make or require many of these investments, from requiring contractors to improve efficiency of use as a condition of receiving Project supplies, to making new investments in recycled water projects under Title XVI and investments in conservation through the Bureau’s WaterSMART program and existing state bond funds.

In addition, this document should include an analysis of the significant progress made in recent years by water users south of the Delta in reducing reliance on the Delta and increasing water use efficiency. This progress has been seen in both the agricultural and urban sectors. For example, the City of Los Angeles has been able to serve the needs of a growing population over the past three decades without increasing the use of imported water. This has been made possible through investments in water use efficiency, water recycling and other tools. In 2011, LADWP adopted a new Urban Water Management Plan that proposes to go further. LADWP now proposes to reduce their use of water imported by MWD from 48 percent of total water use today to 24 percent by 2035. Other cities have adopted similar UWMPs designed to reduce reliance on the Delta.

Water users in the agricultural sector have made similar progress in improving water use efficiency, leading to an ability to generate more revenue using less water. In the agricultural sector, additional progress can be made through improvements in irrigation efficiency, deficit irrigation, land retirement, voluntary water transfers, crop shifting and other tools.

Reclamation should also analyze the additional benefits of investments to reduce reliance on the Delta, including reduced energy use and greenhouse gas emissions.

Finally, Reclamation’s analysis must reflect the state policy, established in SB 7X1 and codified at Water Code § 85021 to reduce reliance on Delta water supplies:

The policy of the State of California is to reduce reliance on the Delta in meeting California’s future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.

This state policy requires Reclamation to change its traditional focus on maximizing water deliveries and focus instead on a broader set of tools that have the potential to reduce reliance on CVP and SWP deliveries. These tools offer the potential to allow water users to meet their needs while assisting in the restoration of the Bay-Delta ecosystem. (Reclamation must comply with this state requirement pursuant § 8 of the Reclamation Act of 1902 and § 3406(b) of the CVPIA.)

In summary, Reclamation can and should analyze ways to increase water supplies to its contractors through a variety of these investments in its alternatives analysis. Reclamation should also consider these and other supplies available to its contractors when analyzing impacts, as investments by the contractors and their member agencies can and should allow the contractors to better meet water needs in a way that is fully compatible with reduced exports under the BiOps.

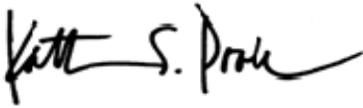
#### Other Issues

Finally, there are a number of additional issues that we urge Reclamation to consider in formulating alternatives and conducting its NEPA review, based on scientific information revealed after the BiOps were finalized and on experience in implementing the BiOps:

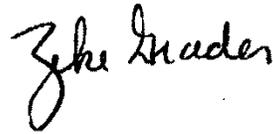
1. Revise the winter run Chinook salmon JPE calculation to reflect the best available science, including corrections for overestimation of in-river survival to the Delta in light of the results of acoustic tagging studies by MacFarlane and others since 2008.
2. Improve the “first flush” trigger to reflect when delta smelt begin upstream migration to spawn.
3. Make seasonal Old and Middle River flow requirements more restrictive to further reduce entrainment of early spawning larval and juvenile delta smelt, consistent with Bennett 2008.
4. Fully analyze and reduce impacts of CVP and SWP operations on primary productivity and food supply for delta smelt and salmonids, including effects of reduced spring outflow, exports, barrier operations, and changes in residence time, consistent with Jassby & Cloern 2000, Kimmerer 2009, and SWRCB 2010.
5. Increase San Joaquin River inflow to reflect SWRCB flow requirements, post-VAMP D-1641 requirements, and the recent testimony of the Department of Fish and Game and others.
6. Consider necessary protections for longfin smelt, particularly increased spring Delta outflow, should the species be listed under the ESA by the Fish and Wildlife Service during the period of remand.

Thank you for considering our input.

Sincerely,



Katherine S. Poole  
Natural Resources Defense Council



Zeke Grader  
Pacific Coast Federation of  
Fishermen's Association



Gary Bobker  
The Bay Institute



Jonas Minton  
Planning and Conservation League



Mark Rockwell  
Northern California Council  
Federation of Fly Fishers

/s/ Gary Mulcahy  
Winnemem Wintu Tribe



Jason Flanders  
San Francisco Baykeeper



Jim Metropulos  
Sierra Club California

/s/ John Mertz  
Sacramento River Preservation Trust

# California **Water Plan** Highlights

INTEGRATED WATER MANAGEMENT



Update 2009 • Department of Water Resources

## Contents

*Highlights* is a summary of California Water Plan Update 2009. Inside these pages, you will find pointers  to where more detailed discussion and information can be found in specific volumes and chapters available online and on the accompanying CD.

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Our water crisis has many aspects: growing population, reduced water supplies, increasing flood risks, declining ecosystems, impaired water bodies, aging water / flood system. .... Pages 2 & 3

### **California Water Resources: Variable and Extreme & Understanding Regional Diversity**

This is a land of geographical extremes and variable water resources. Water systems must withstand the threat of too little water during droughts and too much during floods.

Statewide water balance for eight years, 1998 through 2005. .... Pages 4 & 5

Water balances on a regional scale show the variability in a single year, 2005. .... Pages 6 & 7

### **Climate Change in California: Future Hydrology Unlike the Past & Stressing Our Water Systems**

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Update 2009 builds on the framework and resource management strategies outlined in Update 2005 as it continues to promote two major initiatives: integrated regional water management and improved statewide water and flood management systems. .... Pages 12 & 13

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#### **Implementation Plan: An Urgent Roadmap**

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Integrated regional water management relies on a diversified portfolio of water strategies. Early coordination with land planning agencies will help water suppliers and land planners anticipate and plan for future growth, and ensure that additional regional growth will not exceed water suppliers' capabilities. Here we showcase some regional programs and projects. .... Pages 20 & 21

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*California Water Plan Update 2009 on CD* .... Inside back cover

# Secretary's Message

It is my pleasure to introduce the 2009 California Water Plan Update (Update 2009), which sets forth a blueprint for sustainability and forges a new direction for water management in California. Our new reality is one in which we must manage a resource characterized by uncertainty and vulnerability due to climate change and changing ecosystem needs. Our past hydrology is no longer an accurate indicator of the future.



This Water Plan follows the Update 2005 roadmap of strategies for sustainable water use but with an increased sense of urgency. Update 2009 reinforces the need to follow the principles of integrated water management – statewide and regionally – and to use water efficiently, improve water quality and reliability, and integrate environmental stewardship into every aspect of how we manage our water.

Update 2009 comes on the heels of a historic water legislation package passed by the Legislature and signed into law by Governor Schwarzenegger in November 2009. The landmark legislative package positions California for 21st Century water management by establishing new urban water conservation targets, requiring statewide groundwater monitoring, and creating a new framework for improved governance in the Sacramento-San Joaquin Delta.

The Resource Management Strategies in Update 2009 build upon the new legislation and chart a path forward into a future characterized by risk and uncertainty. There is a new urgency with which we must embrace water use efficiency in the context of climate change and increased urban demand. Improved water conveyance is a strategy from past Water Plans, but is now presented with renewed significance given the context of a Delta ecosystem in continued decline and the threats of seismicity and sea level rise.

New to this Water Plan is an integration of water resource management and flood management throughout the state. This approach aims to increase resiliency in our systems while yielding multiple benefits like increased public safety, habitat protection, and water supply reliability. A critical strategy in Update 2009 is the development of a reliable revenue stream to fund necessary system improvements and to invest in the continued resilience and robustness of California's water resources and the ecosystem that supports them.

Climate change and increasing demand have greatly reduced the flexibility and resilience of the last century's infrastructure investments. Now is the time to recognize our changed conditions and reinvest in that infrastructure in a sustainable manner. In addition to statewide improvements, local resource strategies such as conservation, water recycling, groundwater storage and conjunctive use, urban runoff management, and more can converge in the context of Integrated Regional Water Management (IRWM) planning.

The strategies outlined in these pages provide the means to manage resources comprehensively; from snowmelt to estuary, from field to tap, and all of the uses within the watershed.

California water management cannot be changed overnight, but Update 2009 and the momentum behind it provide the plan, tools, and strategies to achieve momentous change beginning now. I hope you will agree that Update 2009 is the state's blueprint for sustainability and integrated water management and marks a significant new chapter in the way California manages its water resources.

A handwritten signature in black ink, appearing to read 'Lester A. Snow', with a long horizontal flourish extending to the right.

Lester A. Snow  
Secretary for Natural Resources  
The Natural Resources Agency

# California Water Today:

*Although the current drought appears to be comparable to that faced in 1977, conditions in California have changed dramatically:*

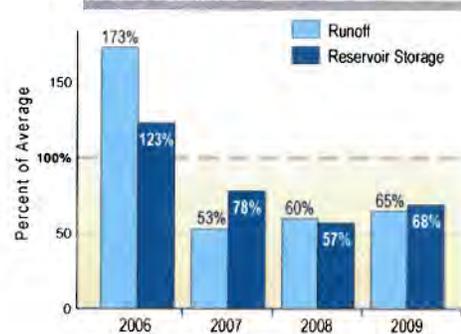
- Population nearly 75 percent higher.
- Reduced water supplies from Colorado River, Owens River, State Water Project, and Central Valley Project.
- Court decisions restrict water exported from the Sacramento-San Joaquin River Delta.

California is facing one of the most significant water crises in its history—one that is hitting hard because it has many aspects and consequences. Reduced water supplies and a growing population are worsening the effects of a multi-year drought. Climate change is reducing our snowpack storage and increasing the frequency and intensity of floods. Court decisions and new regulations have resulted in the reduction of water deliveries from the Delta by about 20 to 30 percent. Key fish species continue to decline. In some areas of the state, our ecosystems and quality of underground and surface waters are unhealthy. The current global financial crisis will make it even more difficult to invest in solutions. We must act now to provide integrated, reliable, sustainable, and secure water resources and management systems for our health, economy, and ecosystems.

## Greater Drought Impacts

Today we are feeling the effects of a major drought. Water Year 2009 was the third consecutive dry year for the state. Because of losses caused by this drought, the U.S. Department of Agriculture in September designated all of the counties within the San Joaquin River, Tulare Lake, and Central Coast Hydrologic Regions as either Primary Natural Disaster Areas or Natural Disaster Areas (statewide total was 21 counties and 29 counties, respectively). The state entered the 2009-2010 Water Year with its key supply reservoirs at only 68 percent of average (see figure). Even if more precipitation develops during this water year, we cannot assume that statewide water supply will fully recover in 2010.

**Statewide runoff and key reservoir storage for water years 2006-09**



Statewide runoff totals and end-of-water-year storage, 2006 to 2009, for key reservoirs (Trinity, Shasta, Oroville, Folsom, Don Pedro, New Melones, and San Luis) as a percentage of average.  
Source: DWR 2009

## Increasing Flood Risk

Every region of California faces flood risks. Nearly 2 million people in California live within areas that can expect flooding on average of once in 100 years. This means that, on average, approximately 20,000 people per year can expect to be affected by floods. More people are moving into these floodplains and flood-prone areas every day. Sacramento, California’s capital, has one of the lowest levels of flood protection of any major city in the nation. Hurricane Katrina provided a vivid reminder of levee vulnerability and consequences of flooding urban areas. Before Katrina, the New Orleans levees were rated as having a 200-year level of flood protection; Sacramento’s levees are rated about one half that amount. The threat of catastrophic flooding, especially in the deep floodplains of the Central Valley and Delta, is a continuing concern.



# Imperative to Act

## Declining Ecosystems

The ecosystems in many areas of the state have declined; many species have been listed as threatened or endangered. Problems with watershed health, lack of suitable habitat, competition with invasive species, toxicity, and water operations contribute to the decline. One of the most obvious examples of an ecosystem in crisis is the Sacramento-San Joaquin Delta. Salmon, delta smelt, and other species are at their lowest levels since records were kept, about 50 years. This decline has led to court restrictions and new regulations on Delta diversions.

## Impaired Water Bodies

The quality of groundwater and surface waters varies significantly throughout the state. We need improvements in drinking water treatment, cleanup of polluted groundwater, salt management, and urban runoff management. A high priority is creating healthy watersheds to keep source water free of pollutants like pathogens and chemicals that are regulated or will be regulated in the near future. Recently, unregulated chemicals and pollutants that were previously not thought to be problematic have emerged as actual or potential contaminants. They can be in pharmaceuticals and personal care products, byproducts of fires and fire suppression, or discarded elements of technology.

## Aging Infrastructure

Conditions today are much different than when most of California's water system was constructed; and upgrades have not kept pace with changing conditions, especially considering growing population; changing societal values, regulations, and operational criteria; and the future challenges accompanying climate change (see pages 8 through 11). California's flood protection system, composed of aging infrastructure with major design and construction deficiencies, has been further weakened by lack of maintenance. State and regional budget shortfalls and a tightened credit market may delay new projects and programs.



Find discussions of California's water challenges in Volume 1, Chapter 4 California Water Today and regional reports of Volume 3

*The entire system—water and flood management, watersheds, and ecosystems—has lost its resilience and is changing in undesirable ways.*



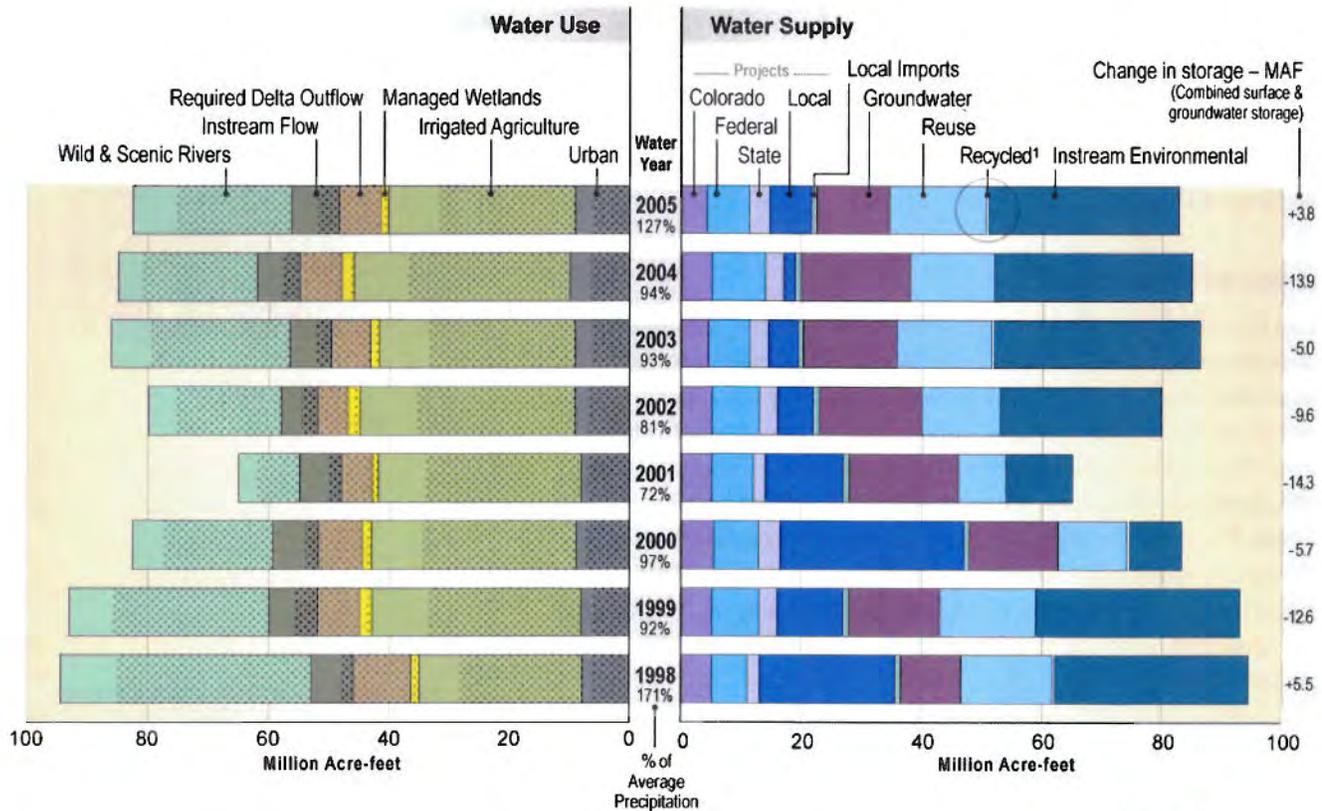
## Future stresses on our water systems

- At what rate will California's population grow into the future?
- What will future urban, agricultural, and ecosystem land uses be?
- What are the limits to California's water supplies?
- How much will climate change result in rising sea level, more severe floods and droughts, and stress on the ecosystem?
- When will a major earthquake cause catastrophic failure of Delta levees and disrupt at least a portion of water supply to 25 million people and millions of acres of farmland?
- How will future regulations change the way the system is operated for water supply, flood management, water quality, and ecosystem health?
- What other unknown challenges (endangered species listings, new health concerns for water quality, etc.) will surface?

# California's Water Resources:

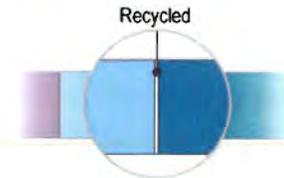
## California Water Balance by Year

A lot of information is presented in this figure including statewide water use, source of supply, annual change in storage, and percentage of average precipitation.



Stippling in bars indicates **depleted (irrecoverable) water use** (water consumed through evapotranspiration, flowing to salt sinks like saline aquifers, or otherwise not available as a source of supply)

<sup>1</sup> Detail of bar graph: For water years 1998-2005, recycled municipal water varied from 0.2 to 0.5 MAF of the water supply.



# Variable and Extreme

California is often recognized as a land of extremes—its diversity in cultures, ecosystems, geography, and water resources. However, “variable” would be a more accurate term to describe its water resources. Precipitation, which is the root of California’s water supplies, varies from place to place, season to season, and year to year. Most of the state’s snow and rain fall in the mountains in the north and eastern parts of the state, and most water is used in the valleys and along the coast. In addition, the state’s ecosystem, agricultural, and urban water users have variable needs for the quantity, quality, timing, and place of use. The water and flood systems face both the threat of too little water to meet needs during droughts and too much water during floods.

Update 2005 began the process of developing water balances to show water used and sources of water for individual years. With Update 2009, statewide balances are available for eight water years, 1998 through 2005 (shown on the previous page). The eight-year sequence did not include any major floods and does not encompass the possible range of far wetter and far drier years in the record.

The figure demonstrates the state’s variability for water use and water supply. “Water use” shows how applied water was used by urban and agricultural sectors and dedicated to the environment; and “water supply” shows where the water came from each year to meet those uses. In addition to what is shown, in an average year about 120 million acre-feet of precipitation and inflows either evaporates, is used by native vegetation, provides rainfall for agriculture and managed wetlands, or flows out of the state or to salt sinks like saline aquifers. (See next page for 2005 regional water balances and information about groundwater overdraft.)

## Key Water Supply and Water Use Definitions

**Applied water.** The total amount of water that is diverted from any source to meet the demands of water users without adjusting for water that is depleted, returned to the developed supply or considered irrecoverable (see water balance figure).

**Instream environmental.** Instream flows used only for environmental purposes.

**Instream flow.** The use of water within its natural watercourse as specified in an agreement, water rights permit, court order, FERC license, etc.

**Recycled water.** Municipal water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.

**Reused water.** The application of previously used water to meet a beneficial use, whether treated or not prior to the subsequent use.

**Urban water use.** The use of water for urban purposes, including residential, commercial, industrial, recreation, energy production, military, and institutional classes. The term is applied in the sense that it is a kind of use rather than a place of use.

**Water balance.** An analysis of the total developed/dedicated supplies, uses, and operational characteristics for a region. It shows what water was applied to actual uses so that use equals supply.

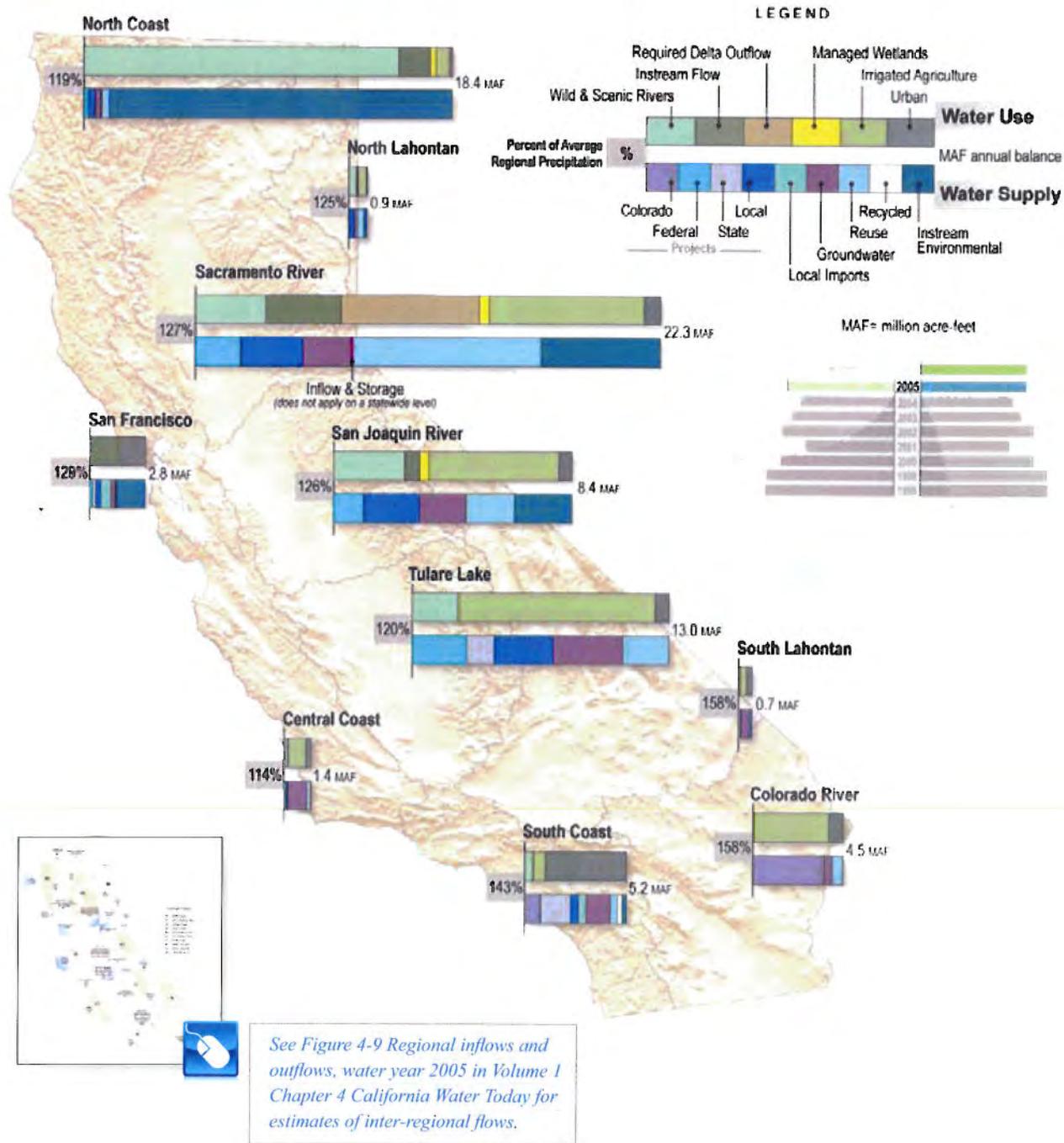


*For a description of California’s variable and sometimes extreme conditions, read Volume 1 Chapter 4 California Water Today*

# California's Water Resources:

## Water Balance by Region for Water Year 2005

Water balances can be used to compare how water supplies and uses can vary between wet, average, and dry hydrologic conditions through the regions and how each region's water balance can vary from year to year.



# Understanding Regional Diversity

California has a variety of climates and landforms. The amount and variability of precipitation can change dramatically between the northern regions of California and its southeast portions such that statewide average information does not truly depict regional conditions. It is common for the winter precipitation to be wet or above average in the northern portions of the state, while below normal to dry in the south and southeast portions for the same winter.

Agricultural, urban, and environmental water uses in a region all vary according to the wetness or dryness in a given year. In very wet water years with excessive precipitation, outdoor water demands are slightly lower due to the high amount of rainfall that directly meets the needs. During the very dry water years, demands for water are reduced as a result of urban and agriculture water conservation practices and because the available surface water supplies are at less-than-normal levels for use.

To better understand California's regional diversities and plan for future needs, the Department of Water Resources divides the state into 10 hydrologic regions. In addition two regional overlays—the Sacramento-San Joaquin River Delta region and the Mountain Counties area—combine areas of common interests.

In Update 2009, regional water portfolios provide information about annual water use and water supply balances for the 10 hydrologic regions and the Mountain Counties area for years 1998 through 2005. The figure on the facing page depicts balances for the hydrological regions for year 2005, considered a wet year statewide. Water balances can be used to compare how water supplies and uses can vary between wet, average, and dry hydrologic conditions through the regions and how each region's water balance can vary from year to year.

## Groundwater

Each year on average, about 2 million acre-feet more groundwater is used than what naturally recharges – called groundwater overdraft. Overdraft is characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. Overdraft can lead to increased extraction costs, land subsidence, water quality degradation, and environmental impacts.



To better understand California's variable and sometimes extreme differences, read Volume 3 Regional Reports.

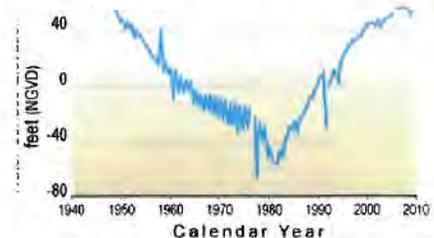
## Groundwater Overdraft

The two hydrographs below show the response of groundwater levels to differing water management regimes. The first hydrograph shows groundwater levels declining in response to agricultural development in the San Joaquin Valley. Groundwater levels recover somewhat during the wet period of the early 1980s, but continue to decline through the 1980s and 1990s. The second hydrograph shows a similar groundwater level decline in response to development in southern Yuba County. However, groundwater levels begin to recover in the early 1980s when surface water imports from Yuba County Water Agency began. The hydrograph shows a decline in groundwater levels during the early 1990s drought as surface water imports were curtailed and groundwater was more heavily relied upon. Continued conjunctive water management action resulted in the refilling of the South Yuba Groundwater Subbasin, which continues up to present.

**Kings Basin, Fresno County**



**Brophy Water District, South Yuba County**



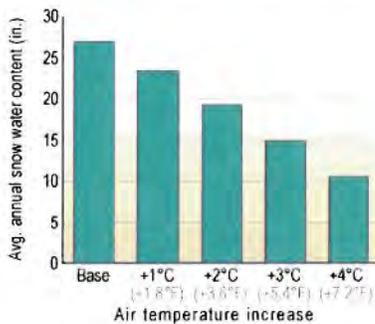
# Climate Change:

**B**y and large, California’s reservoirs and water delivery systems were designed, and operating rules have been developed, using historical hydrology – an assumption that the past is a good guide to the future. With climate change, that assumption may no longer be valid.

## What Has Already Happened?

Looking over the past century, the following changes are evident:

- California’s temperature has risen one degree Fahrenheit, mostly at night and during the winter, with higher elevations experiencing the greatest increase.
- Average early spring snowpack in the Sierra Nevada has decreased by about 10 percent, a reduction of 1.5 million acre-feet of water in storage (one acre-foot of water is enough for one to two families for one year). Seasonal snowpack of the Sierra Nevada is California’s largest surface water storage.
- Sea level along California’s coast has risen 7 inches.
- Flood peaks in the state’s rivers have increased.
- Climate patterns are more variable.



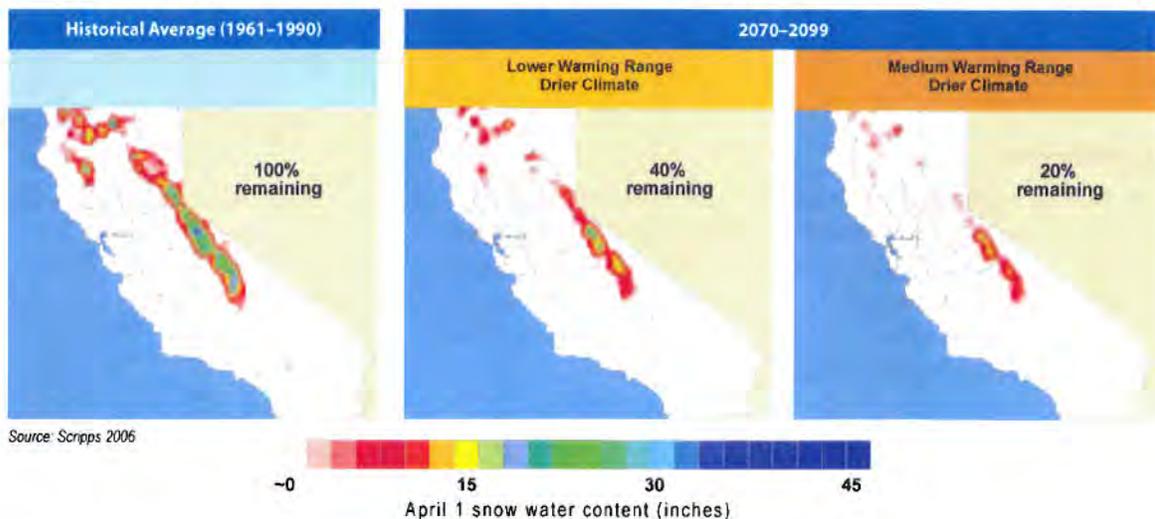
## Average Annual Snowmelt for Upper Feather River Basin

Warming air temperatures may cause some of our precipitation to shift from snow to rain. This would lead to a reduction in the amount of snowpack, an important natural reservoir for storing water in the winter and later augmenting the water supply as spring snowmelt. Climate-change-induced shifts in the timing and the amount of snowmelt runoff may require revising traditional water planning practices. The Upper Feather River Basin provides water for Lake Oroville, the main water supply reservoir for the State Water Project.

Source: DWR 2009

## Decreasing California Snowpack

These figures show projections of how two climate scenarios may reduce Sierra snowpacks to 40% and 20% of recent historical averages



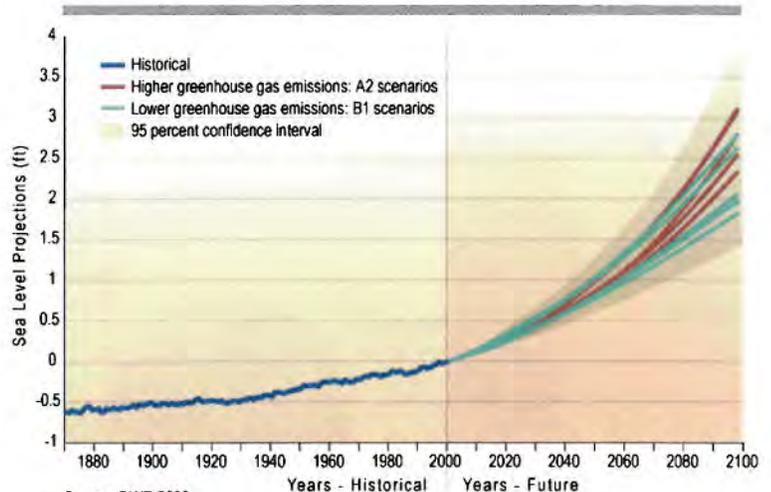
# Future Hydrology Unlike the Past

## What More is Expected?

Looking forward to the year 2050 and on to the end of the century, more changes can be expected:

- California’s mean temperature may rise 1.5 degrees to 5.0 degrees Fahrenheit by 2050 and 3.5 degrees to 11 degrees by the end of the century.
- Sierra Nevada snowpack may decrease by 25 to 40 percent by mid-century, a storage volume about 3.8 million acre-feet to 6 million acre-feet, from a little less to a little more than the capacity of California’s largest constructed surface reservoir.
- Average annual precipitation may show little change, but more intense wet and dry periods can be expected – more floods and more droughts.
- Flood peaks will become higher and natural spring/summer runoff will become lower.
- Studies show a possible global sea level rise of 4 to 16 inches by mid-century and 7 to 55 inches by the end of the century.
- Higher sea levels will increase salinity in the Delta.

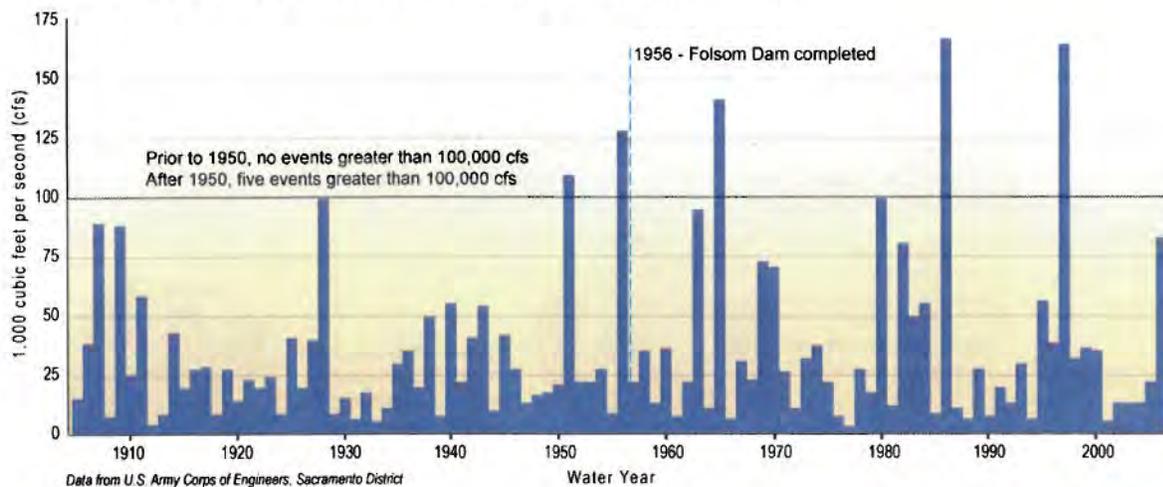
Historical and Projected Sea Level at Golden Gate



Source: DWR 2009

## American River Runoff Annual Maximum 3-Day Flow

The five highest floods of record on the American River have occurred since 1950.



Data from U.S. Army Corps of Engineers, Sacramento District



Read more on climate change in Volume 1 Chapter 5 *Managing an Uncertain Future* and Chapter 6 *Integrated Data and Analysis*. Find technical and support articles in Volume 4 *Reference Guide*.

# Climate Change:

## What are the Expected Impacts from These Changes?

Climate change is already having a profound effect on California's water resources as evidenced by changes in snowpack, river flows, and sea levels. Scientific studies show these changes will increase stress on the water systems in the future. Because some level of climate change is inevitable, the water systems must be adaptable to change.

The impacts of these changes will gradually increase during this century and beyond. California needs to plan for water system modifications that adapt to the following impacts of climate change:

### Water Supply

Changes in river flow impacts water supply, water quality, fisheries, and recreation activities.



A reduction of snowpack will change water supply



### Ecosystem

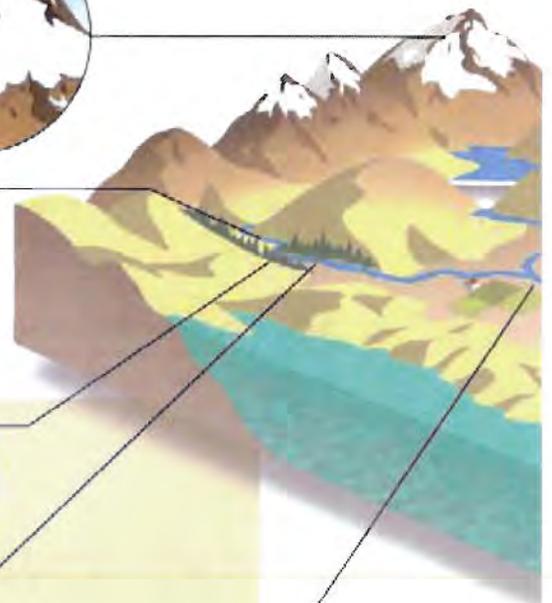
Forests, important contributors to water supply and quality, will be more vulnerable to pests, disease, changes in species composition, and fire.



Increases in water temperature and reductions in cold water in upstream reservoirs may hurt spawning and recruitment success of native fishes.



Lower streamflows will tend to concentrate urban and agricultural runoff, creating more water quality problems.



# Stressing Our Water Systems

## Water & Power Operations



Operation of the water system for urban, agricultural, and environmental water supply and for flood management will become increasingly difficult because of the decisions and trade offs that must be made.



Water supply reliability will be compromised.

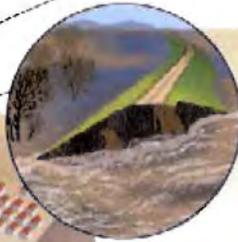


California's hydroelectric power generation may be less reliable; at the same time, higher air temperatures may increase energy consumption through increased use of air conditioning.

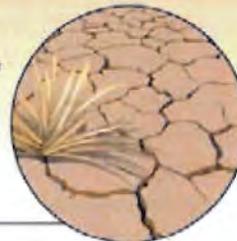


Warmer temperatures will affect water demands.

## Flooding & Drought



Increased flooding potentially causes more damage to the levee system.



Higher temperatures and changes in precipitation will lead to droughts.

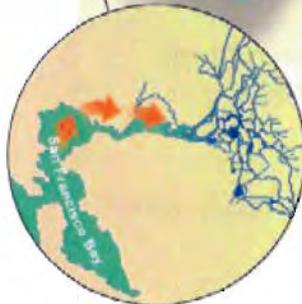
## Coast & Delta



Higher water temperatures will make the Delta intolerable to some native species and also more attractive to some non-native invaders that may compete with natives.



Sea level rise threatens coastal communities and infrastructure, in particular, the water system in the Sacramento-San Joaquin Delta where the existing Delta levees were not designed or constructed to withstand these higher water levels.



Increased salinity in the Delta will degrade drinking and agricultural water quality and alter ecosystem conditions.

# California Water Plan Update 2009:



## Integrated Water Management

The California Water Plan updates have been important sources of information for water planners since 1957. But unlike prior Water Plan updates, which were primarily products of the Department of Water Resources, Update 2009 truly can be viewed as the state's Water Plan. It has benefited from the first interagency California Water Plan steering committee representing 21 state government agencies with jurisdictions over different aspects of water resources and integrates their companion planning documents. In addition, a 45-member advisory committee, expanded regional outreach, greater involvement of California Native American Tribes, and coordination with federal agencies provided broad participation in plan preparation.

Update 2009 builds on the framework and resource management strategies outlined by California Water Plan Update 2005 promoting two major initiatives:

- **Integrated regional water management** enables regions to implement strategies appropriate for their own needs and helps them become more self-sufficient.
- **Improved statewide water and flood management systems** provides for upgrades to the large physical facilities, such as the State Water Project, and statewide management programs essential to the California economy.

To minimize the impacts of water management on California's natural environment and make sure that the state continues to have the water supplies it needs, the two initiatives are supported by three foundational actions:

- Use water efficiently to get maximum utility from existing supplies.
- Protect water quality to safeguard public and environmental health and secure the state's water supplies for their intended purposes.
- Expand environmental stewardship as part of water management responsibilities.



# California Vision 2050:

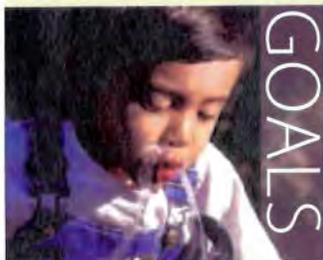
Update 2009 sets us on a strategic path to managing our water resources in a way that pro



## Desired future for California water

California has healthy watersheds and integrated, reliable and secure water resources and management systems that

- Enhance public health, safety, and quality of life in all its communities;
- Sustain economic growth, business vitality, and agricultural productivity; and
- Protect and restore California's unique biological diversity, ecological values, and cultural heritage.



## Desired outcomes over the planning horizon 2050

1. California has water supplies that are adequate, reliable, secure, affordable, sustainable, and of suitable quality for beneficial uses to protect, preserve, and enhance watersheds, communities, and environmental and agricultural resources.
2. State government supports integrated water resources planning and management through leadership, oversight, and public funding.
3. Regional and interregional partnerships play a pivotal role in California water resources planning, water management for sustainable water use and resources, and increasing regional self-sufficiency.
4. Water resource and land use planners make informed and collaborative decisions and implement integrated actions to increase water supply reliability, use water more efficiently, protect water quality, improve flood protection, promote environmental stewardship, and ensure environmental justice in light of drivers of change and catastrophic events.
5. California is prepared for climate uncertainty by developing adaptation strategies and investing in a diverse set of actions that reduce the risk and consequences posed by climate change, that make the system more resilient to change, and that increase the sustainability of water and flood management systems and the ecosystems they depend on.
6. Integrated flood management, as a part of integrated water management, increases flood protection, improves preparedness and emergency response, enhances floodplain ecosystems, and promotes sustainable flood management systems.
7. The benefits and consequences of water decisions and access to state government resources are equitable across all communities.

Vision & Mission

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Goals

•

Guiding Principles

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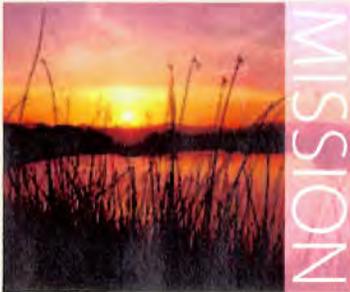
Objectives & Actions

•

Recommendations

# The Desired Future for Water

provides reliable and clean water supplies for all beneficial uses today and for generations.



## Purpose of the Water Plan

Updating the California Water Plan provides state, federal, Tribal, regional, and local governments and organizations a continuous strategic planning forum to collaboratively:

- Recommend strategic goals, objectives, and near-term and long-term actions that would conserve, manage, develop, and sustain California's watersheds, water resources, and management systems;
- Prepare response plans for floods, droughts, and catastrophic events that would threaten water resources and management systems, the environment, property, and the health, welfare, and livelihood of the people of California; and
- Evaluate current and future watershed and water conditions, challenges, and opportunities.



## Core values and philosophies / How to make decisions

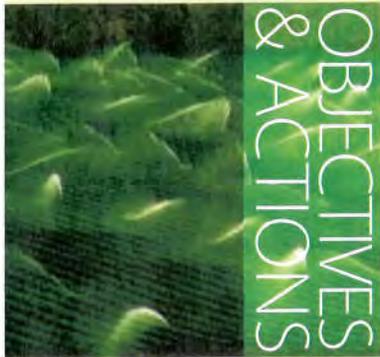
1. Use a broad, stakeholder-based, long-view perspective for water management.
2. Promote management for sustainable resources on a watershed basis.
3. Increase regional drought and flood preparedness.
4. Increase regional self-sufficiency.
5. Promote regional coordination and collaboration among local governments and agencies, public and private organizations, and Tribal governments and Tribal communities.
6. Determine values for economic, environmental, and social benefits, costs, and tradeoffs to base investment decisions on sustainability indicators.
7. Incorporate future variability, uncertainties, and risk in the decision-making process.
8. Apply California's water rights laws, including the longstanding constitutional principles of reasonable use and public trust, as the foundation for public policy-making, planning, and management decisions on California water resources.
9. Promote environmental justice -- the fair treatment of people of all races, cultures, and incomes.
10. Use science, best data, and local and indigenous peoples' knowledge in a transparent and documented process.



*Read more about the Water Plan's strategic plan elements in Volume 1 Chapter 2 Imperative to Act*

# Implementation Plan

Update 2009's implementation plan has 13 objectives that will help us achieve the Water Plan will help California deal with a changing climate and other uncertainties and risks, and provide



*Numbering of elements in this strategic plan is for ease of reference and does not represent priority*

## Statements of intent / What and when

### 1. **Expand Integrated Regional Water Management**

Promote, improve, and expand Integrated Regional Water Management to create and build on partnerships that are essential for California water resources planning, sustainable watershed and floodplain management, and increasing regional self-sufficiency.

### 2. **Use and Reuse Water More Efficiently**

Use water more efficiently with significantly greater water conservation, recycling, and reuse to help meet future water demands and adapt to climate change.

### 3. **Expand Conjunctive Management of Multiple Supplies**

Advance and expand conjunctive management of multiple water supply sources with existing and new surface water and groundwater storage to prepare for future droughts, floods, and climate change.

### 4. **Protect Surface Water and Groundwater Quality**

Protect and restore surface water and groundwater quality to safeguard public and environmental health and secure California's water supplies for their beneficial uses.

### 5. **Expand Environmental Stewardship**

Practice, promote, improve, and expand environmental stewardship to protect and enhance the environment by improving watershed, floodplain, and instream functions and to sustain water and flood management systems.

### 6. **Practice Integrated Flood Management**

Promote and practice integrated flood management to provide multiple benefits including better emergency preparedness and response, higher flood protection, more sustainable flood and water management systems, and enhanced floodplain ecosystems.

### 7. **Manage a Sustainable California Delta**

Set as co-equal goals a healthy Delta ecosystem and a reliable water supply for California and recognize the Delta as a unique and valued community and ecosystem to promote and practice management for a sustainable California Delta.

### 8. **Prepare Prevention, Response, and Recovery Plans**

Prepare prevention, response, and recovery plans for floods, droughts, and catastrophic events to help residents and communities, particularly disadvantaged communities, make decisions that reduce the consequences and recovery time of these events when they occur.

# Plan: An Urgent Roadmap

goals. Meeting these objectives, and planning and investing in their 115-plus related actions, more adaptive and resilient ecosystems and more sustainable water and flood systems.

## 9. Reduce Energy Consumption of Water Systems and Uses

Reduce the energy consumption of water and wastewater management systems by implementing the water-related strategies in AB 32 Scoping Plan to mitigate greenhouse gas emissions.

## 10. Improve Data and Analysis for Decision-making

Improve and expand monitoring, data management, and analysis to support decision-making, especially in light of uncertainties, that support integrated regional water management and flood and water resources management systems.

## 11. Invest in New Water Technology

Identify and fund applied research on emerging water technology to make them attainable and more cost effective.

## 12. Improve Tribal Water and Natural Resources

Develop Tribal consultation, collaboration, and access to funding for water programs and projects to better sustain Tribal water and natural resources.

## 13. Ensure Equitable Distribution of Benefits

Increase the participation of small and disadvantaged communities in state processes and programs to achieve fair and equitable distribution of benefits. Consider mitigation of impacts from the implementation of state government programs and policies to provide safe drinking water and wastewater treatment to all California communities and ensure that these programs and policies address the most critical public health threats in disadvantaged communities.



*Find details of the Water Plan's objectives and related actions in Volume 1 Chapter 7 Implementation Plan*

# Building on a Framework

Update 2009 uses the same framework presented in Update 2005 and enhances it in several areas:

- Integrates information and recommendations from many state plans and initiatives, particularly those agencies on the Water Plan Steering Committee.
- Incorporates consideration of uncertainty, risks, and resource sustainability into planning for the future to reduce uncertainties, recognize risks to success, and manage for more sustainable water supply, flood management, and ecosystems.
- Includes integrated flood management and drought contingency plan.
- Advances climate change adaptation and mitigation strategies.
- Includes information from Native American Tribes and proceedings from the 2009 California Tribal Water Summit.
- Updates resource management strategies and regional reports.
- Extends regional and statewide water balances to include eight years.
- Includes a plan for improving data, analytical tools, and information management and exchange.
- Further acknowledges that the Water Plan as a living document will continue to evolve and adapt integrated water management.



*Update 2009 integrates information and recommendations from key state plans and initiatives. See Volume 1, Chapter 3 Companion State Plans*

## Transitioning from Extraction to Sustainable Outcomes

Incorporating the concept of resource sustainability is an ongoing process or approach that will continue to be developed in future Water Plan updates. A system that is sustainable meets today's needs without compromising the ability of future generations to meet their own needs. A sustainable system generally provides for the economy, the ecosystem, and equity.

Over the past few decades, questions have been raised about how sustainable our ecosystems and water, land, and other resources are, given current management practices and expected future changes. California's water resources are finite and now require managing for sustainability—management that may be different than what has been practiced during the first 150 years of the state's history.

To achieve sustainability, resource managers and planners must transition from the past model that places value primarily on water supply yield and extraction to a model that values sustainable outcomes.



*Find more about the roadmap to safe and clean water through 2050 in Volume 1 Chapter 2 Imperative to Act and Chapter 7 Implementation Plan.*



# Water Scenarios 2050:



What will California look like in 2050? Will the population growth keep pace with recent trends? Will the pattern of climate change continue? Will the protection of water quality and endangered species be driven mostly by lawsuits, creating a patchwork of legal requirements? We have no way of predicting the future, but we can construct some plausible scenarios. Future scenarios can be used to help us better understand the implications of future conditions on water management. Update 2009 made significant improvements to the scenarios by considering the potential effect of long-term climate change on future water demands. (See more on climate change in Highlights pages 8 through 11.)

The California Water Plan acknowledges that planning for the future is uncertain and that change will continue to occur. It is not possible to know for certain how population, water demand patterns, environmental conditions, the climate, and many other factors that affect water use and supply may change by 2050. To anticipate change, our approach to water management and planning for the future needs to incorporate consideration of uncertainty, risk, and sustainability.

Update 2009 uses three future scenarios for year 2050 to illustrate how the water community would need to respond to a variety of future conditions. Regions respond by implementing a mix of resource management strategies. (See more about resource management strategies on Highlights pages 18 and 19 and examples of regional strategies on Highlights pages 20 and 21.) The title of each scenario—Current Trends, Slow & Strategic Growth, and Expansive Growth—tells us something about how different factors, like population, irrigated farmland, or background water conservation (plumbing code changes, natural replacement, actions water users implement on their own, etc.), are assumed to change over time. These are factors over which the water community has little control yet affect future water demand for the urban, agricultural, and environmental sectors.

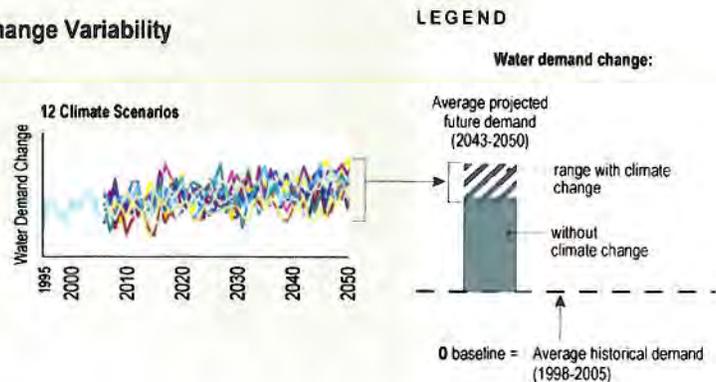
## Factors of Uncertainty

- Population
- Land Use
- Irrigated Crop Area
- Environmental Water
- Background Water Conservation

## Water Demand Changes and Climate Change Variability

The graph under each scenario represents future water demand change (the difference between the average demands for 2043-2050 and 1998-2005.) This change could be either an increase (above baseline) or a decrease (below baseline) in water use.

Climate change adds another dimension of variability to demand changes. In figure at right, historical period shows actual demand (blue line). Each colored line represents 1 of 12 climate scenarios. This variability is represented on the water demand change graph by the hatched area.

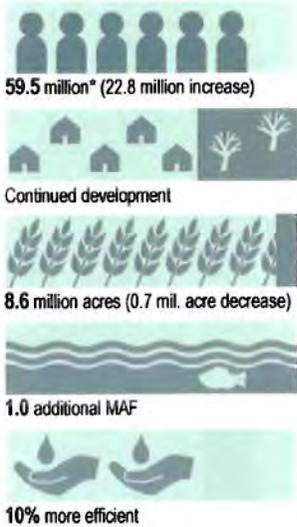


# Factors That Shape Our Future

An uncertain future to which the water community will need to respond

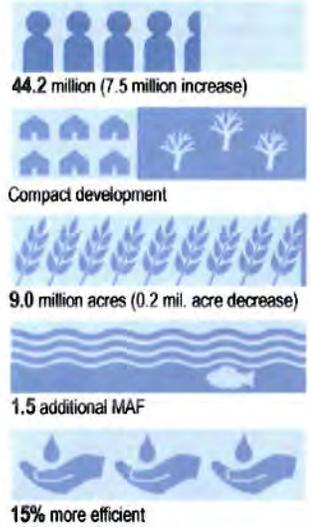
## Current Trends

Recent trends are assumed to continue into the future. Regulations are not coordinated or comprehensive, creating uncertainty for planners and managers. The state continues to face lawsuits, from flood damages to water quality and endangered species protections.



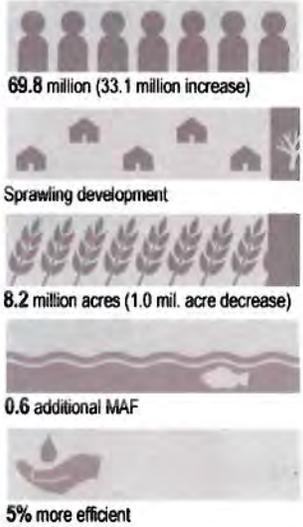
## Slow & Strategic Growth

Private, public, and governmental institutions form alliances to provide for efficient planning and development that is less resources intensive than current conditions. State government implements comprehensive and coordinated regulatory programs to improve water quality, protect fish and wildlife, and protect communities from flooding.



## Expansive Growth

Future conditions are more resource intensive than existing conditions. Protection of water quality and endangered species is driven mostly by lawsuits. State government has responded on a case-by-case basis, creating a patchwork of regulations and uncertainty for planners and water managers.

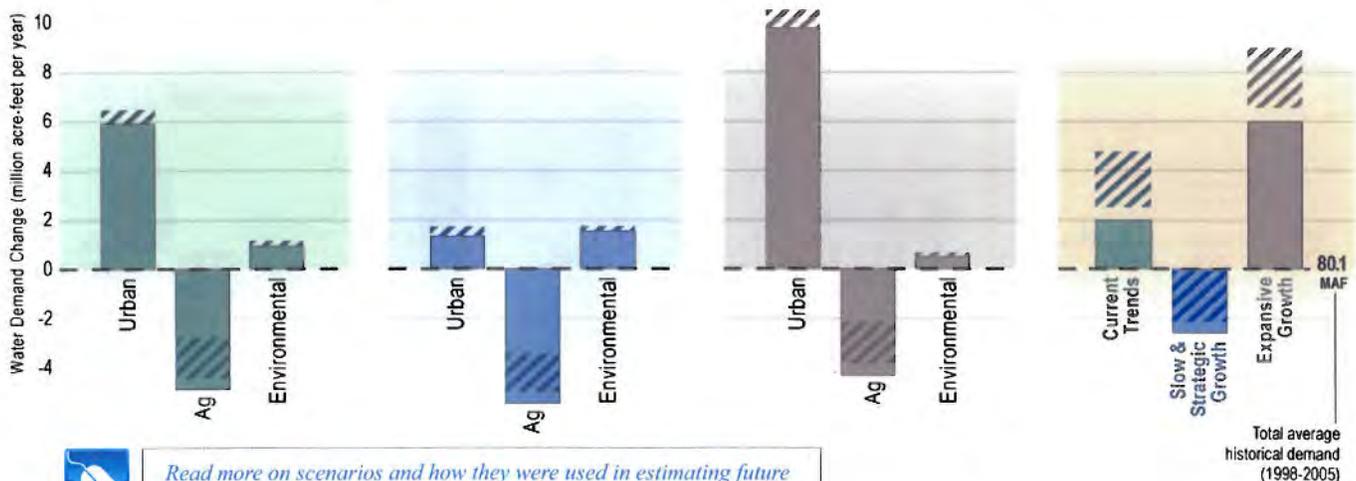


The charts at the bottom of this page show net change in statewide water demand between 2005 and 2050 for each scenario. (See pages 16 and 17 for potential water demand changes for each hydrologic region.)

\* Department of Finance population projection

### 2050 Water Demand Changes by Scenario

### Combined Water Demand Change by Scenario

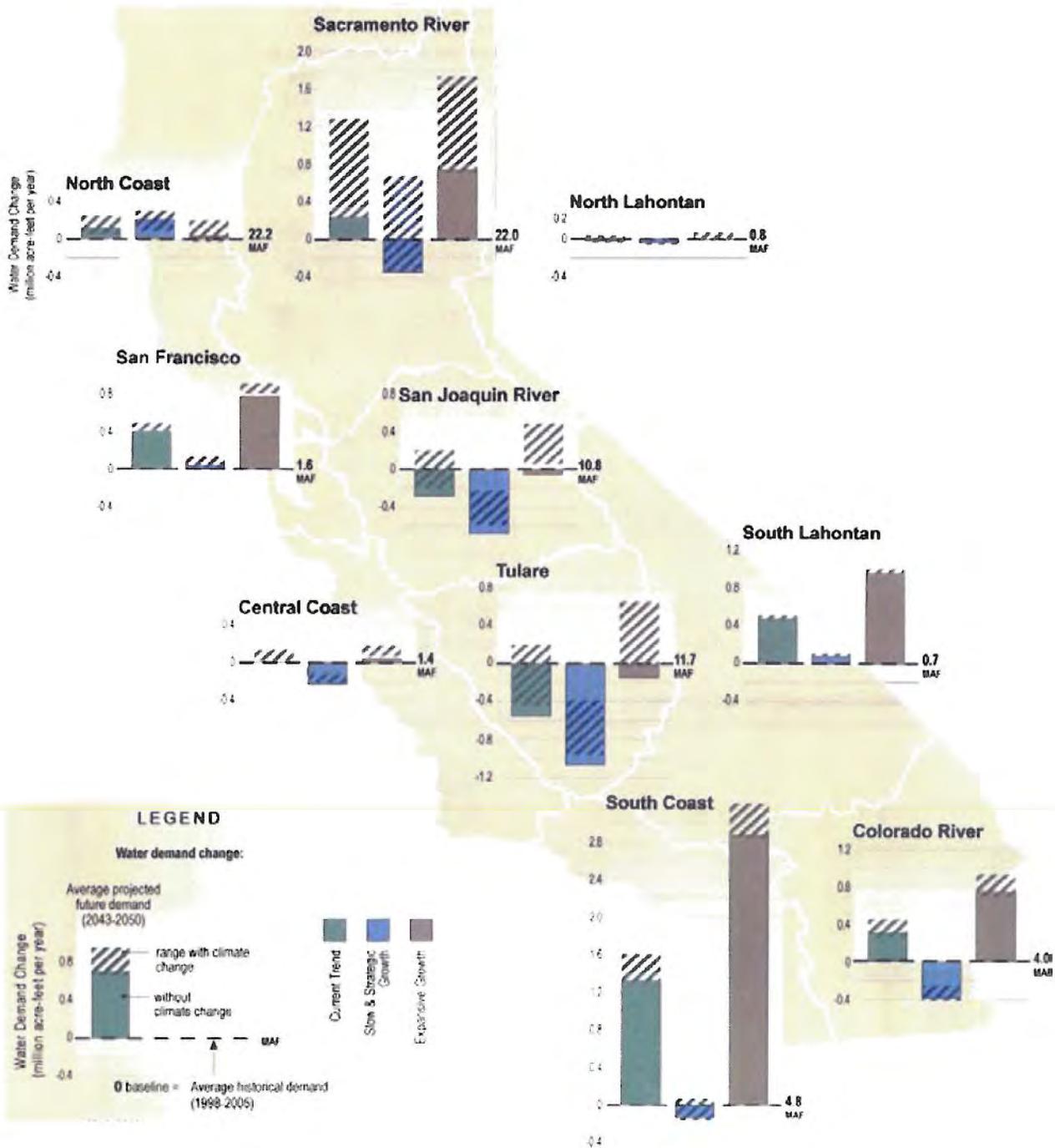


Read more on scenarios and how they were used in estimating future water demand in Volume 1, Chapter 5 Managing an Uncertain Future

# Water Scenarios 2050:

## Future Regional Water Demand Changes by Scenario

Hydrologic regions expecting higher population growth show higher changes in water demands. Water demand changes in Central Valley agricultural areas were most sensitive to the warmer and drier climate change scenarios.



# From a Regional Perspective

The three baseline scenarios for 2050 (described on pages 14 and 15) would play out differently in various hydrologic regions. This regional variability is illustrated in the figure at left, showing the combined urban, agricultural, and environmental water demand changes for each scenario in each region.

The way scenario water demands change in each region reflects a number of things—the relative amount of water demand in the region for cities, farms, and environment; how the scenario factors (population, irrigated crop acreage, and water dedicated to the environment) increase or decrease in each area of the state; and how temperature and precipitation changed regionally in the 12 climate change scenarios examined.

Hydrologic regions expecting higher population growth under the Current Trends and Expansive Growth scenarios, like the South Coast and the Sacramento River, show higher changes in water demands. Population growth also tends to drive urbanization of agricultural lands, reducing irrigated crop acreage.



Precipitation and temperature heavily influence water demand for outdoor landscaping and irrigated agriculture. Less precipitation falling during the growing season increases the need to apply more irrigation water. Warmer temperatures increase crop evapotranspiration, which increases water demand.

Water demand stays the same or decreases in the San Joaquin River and Tulare Lake regions when climate change was not considered because of less irrigated crop area from urbanization and more background water conservation. Water demand changes in Central Valley agricultural areas were most sensitive to the warmer and drier climate change scenarios. This is particularly evident in the Sacramento River Region where the variation in potential change in water demand is quite large across the 12 climate change scenarios.

Each future scenario describes a different baseline for 2050, to which the water community would need to respond by implementing a mix of the resource management strategies shown on pages 18 and 19. No single management strategy is sufficient to meet future regional demands with so much variation possible from region to region and sector to sector. California needs to ensure that each region can tailor responses to local conditions. We can achieve this most effectively by implementing integrated regional water management supported by strong statewide water management systems.



*Read how future scenarios can help us deal with uncertainty and risk and improve resource sustainability in Volume 1 Chapter 5 Managing an Uncertain Future and Chapter 6 Integrated Data and Analysis. Find regional water demand information in Volume 3 Regional Reports.*

# Resource Management Strategies:

Integrated water management undertakes water and flood management at all fronts and on many levels—regionally and statewide, for multiple uses and benefits, for sustaining watersheds, water uses, and water and flood management systems, while weighing the risks of uncertain futures.

The 27 resource management strategies presented here provide a range of choices and are the building blocks for this approach. The strategies are grouped by their intended outcome, and the potential benefits and implementation cost are presented for each strategy.

Potential Strategy Benefits <sup>1</sup>										
 Provide Water Supply Benefit	MAF/year <sup>2</sup> - Applied Water	 Improve Drought Preparedness	 Improve Water Quality	 Operational Flex & Efficient	 Reduce Flood Impacts	 Environmental Benefits	 Energy Benefits	 Recreational Opportunities	 Reduce GW Overdraft	 Accumulated Cost by 2030 (\$ Billions)

## Reduce Water Demand

Water conservation has become a viable long-term supply option because it saves considerable capital and operating cost for utilities and consumers, avoids environmental degradation, and creates multiple benefits.

Strategy	MAF/year <sup>2</sup>	Potential Strategy Benefits <sup>1</sup>							Accumulated Cost by 2030 \$ Billions <sup>2</sup>
Agricultural Water Use Efficiency	 0.1 - 1.0 <sup>3</sup>								0.3 - 5.0
Urban Water Use Efficiency	 1.2 - 3.1								2.5 - 6.0

## Improve Operational Efficiency & Transfers

California's water system responds to our need to move water from where it occurs to where it will be used.

Strategy	MAF/year <sup>2</sup>	Potential Strategy Benefits <sup>1</sup>							Accumulated Cost by 2030 \$ Billions <sup>2</sup>
Conveyance—Delta	 N/A								1.2 - 17.2
Conveyance—Regional/Local	 N/A								N/A
System Reoperation	 N/A								N/A
Water Transfers	 N/A								N/A

## Increase Water Supply

California's communities are finding innovative ways to generate new supplies.

Strategy	MAF/year <sup>2</sup>	Potential Strategy Benefits <sup>1</sup>							Accumulated Cost by 2030 \$ Billions <sup>2</sup>
Conjunctive Management & Groundwater Storage	 0.5 - 2.0								N/A
Desalination – Brackish & Seawater	 0.3 - 0.4								2.0 - 3.0
Precipitation Enhancement	 0.3 - 0.4								0.1 - 0.2
Recycled Municipal Water	 1.8 - 2.3								6.0 - 9.0
Surface Storage—CALFED	 0.1 - 1.1								0.7 - 9.2
Surface Storage—Regional/Local	 N/A								N/A

1. Actual resource management strategy benefits, e.g., reducing groundwater overdraft, will depend on how strategies are implemented.  
 2. Additional information is found in resource management strategies and Volume 5 Technical Guide.  
 3. Value is Net Water to account for water reuse among agricultural water users.

N/A= Not Available

# A Range of Choices

As California changes, local agencies and governments continue to use different methods for managing water resources. Growing population, changing regulations, and evolving public attitudes and values are a few conditions that are influencing water decisions. No single response package will work for all areas of California. Facing an uncertain future, regions need to invest in an appropriate mix of strategies based on integrated regional water management plans that are diversified, satisfy regional and state needs, meet multiple resource objectives, include public input, address environmental justice, mitigate impacts, protect public trust assets, and are affordable.

## Improve Water Quality

Improved water quality can directly improve the health of Californians and our ecosystem.

Strategy	MAF/year <sup>2</sup>	Potential Strategy Benefits <sup>1</sup>	Accumulated Cost by 2030 \$ Billions <sup>2</sup>
Drinking Water Treatment and Distribution	N/A		1.4/year
Groundwater/Aquifer Remediation	N/A		20.0
Matching Quality to Use	N/A		0.1
Pollution Prevention	N/A		21.0
Salt and Salinity Management	N/A		>10.0
Urban Runoff Management	N/A		N/A

## Practice Resource Stewardship

We must protect other resources as we make water supplies available for other beneficial uses.

Strategy	MAF/year <sup>2</sup>	Potential Strategy Benefits <sup>1</sup>	Accumulated Cost by 2030 \$ Billions <sup>2</sup>
Agricultural Lands Stewardship	N/A		5.3
Economic Incentives (Loans, Grants, Water Pricing)	N/A		N/A
Ecosystem Restoration	N/A		N/A
Forest Management <sup>4</sup>	0.1 - 0.5		0.3 - 0.8
Land Use Planning and Management	N/A		N/A
Recharge Area Protection	N/A		N/A
Water-dependent Recreation			N/A
Watershed Management	N/A		0.5 - 3.6

## Improve Flood Management

Strategy	MAF/year <sup>2</sup>	Potential Strategy Benefits <sup>1</sup>	Accumulated Cost by 2030 \$ Billions <sup>2</sup>
Flood Risk Management	N/A		N/A

4. Numbers are for Meadow Restoration only.

**NOTE:** The water supply benefits are not additive. Additional select unit cost information is found in Box 1-2 of Volume 2. Although presented individually, the resource management strategies are alternatives that can complement each other or compete for limited system capacity, funding, water supplies, or other components necessary for implementation. Assumptions, methods, data, and local conditions vary per strategy.

N/A= Not Available



Find descriptions of 27+ resource management strategies in Volume 2.

# Regional Strategies:

**R**egional partnerships in many parts of the state are successfully employing a mix of resource management strategies. Experience is showing that these regional efforts can better resolve regional needs, especially when paired with statewide water management systems.

With Integrated Regional Water Management (IRWM), regions have been able to take advantage of opportunities that are not always available to individual water suppliers: reduce dependence on imported water and make better use of local supplies; enhance use of groundwater with greater ability to limit groundwater overdraft; increase supply reliability and security; and improve water quality. More is being done to meet water demands with water conservation, reoperation of facilities, water recycling, groundwater storage and management, transfer programs, and, in limited cases, regional or local surface storage reservoirs. Overall, this increased focus on IRWM solves water management problems more efficiently, considers other resource issues, and enjoys broader public support.

IRWM provides an effective forum and a critical framework for actions to address the uncertainties presented by climate change as well as other risks to California's water future. The extent to which regions have carried these out has been driven by considerations like economics, environment, engineering, and institutional feasibility. For more information on the IRWM Program, go to Web site:

<http://www.water.ca.gov/irwm/>



See more about regional strategies in Volume 3 regional reports.



## North Coast

- Araujo Dam Restoration Project
- Newell Water System Upper Mattole River Culvert Replacement
- Westport Water Tank



## San Francisco Bay

- Mocho Groundwater Demineralization Plant
- Water Saving Hero Campaign



## San Joaquin River

- Yosemite Spring Park Utility Company Improvements



## South Coast Los Angeles

- Calleguas Regional Salinity Management Project
- Arundo Removal
- Las Virgenes Creek Restoration
- Joint Water Pollution Control Plant Marshland Enhancement (Bixby Marshland)



## Santa Ana

- Arlington Desalter
- Orange County Groundwater Replenishment System
- Solar Array at RP-5 Wastewater Treatment Plant



## San Diego

- Tri-County Funding Area Coordinating Committee
- El Monte Valley Groundwater Recharge and River Restoration Project
- Carlsbad Desalination Project Local Conveyance
- Rancho California Water District Water Reclamation Project
- Santa Margarita Conjunctive Use Project

# Multiple Responses and Benefits




**Sacramento River**

- Red Clover Valley Restoration – Upper Feather River Watershed
- The Bear River Project: Reducing Legacy Mercury Contamination



**North Lahontan**

- Merrill Davies Meadow Restoration Project




**Central Coast**

- Groundwater Recharge Enhancement
- City of Watsonville Recycled Water Facility and Pajaro Valley Water Management Agency Coastal Distribution System
- Salinas Valley Water Project
- Santa Maria Wastewater Treatment Plant Expansion
- Los Osos Wastewater Project



**Tulare Lake**

- Southern Sierra IRWM Effort
- Alta Irrigation District Harder Pond recharge and banking project



**South Lahontan**

- Inyo-Mono Integrated Regional Water Management Project
- Upper Amargosa Creek Recharge and Nature Park Project
- Antelope Valley Regional Recycled Water Project




**Colorado River**

- Coachella Valley Regional Water Management Group potential projects include water conservation, recycling, conjunctive use and water quality improvements.
- Salton Sea restoration partnership
- Coachella Canal Lining
- All-American Canal Project

• Regional strategies information provided by Roundtable of Regions



# Recommendations

California Water Plan Update 2009 identifies the most pressing water management issues and challenges faced statewide and by regions and the available opportunities and assets. Through the Water Plan process, we have developed recommendations in the form of policies, strategies, and approaches that will help reduce and remove impediments, and leverage resources and opportunities to help implement the Water Plan actions and achieve its goals and objectives through 2050.

These recommendations are summarized here and described in Volume 1 Chapter 2 Imperative to Act. They are directed at decision-makers and water users throughout California (referred to as *California*) and at the executive and legislative branches of state government, the Department of Water Resources and other state agencies (referred to as *state government*).

1. California should implement and invest in the Water Plan's actions as the key to achieving its goals and objectives.
2. California needs a water finance plan with stable and continuous funding from an array of revenue sources for integrated water management on a statewide and regional basis. The finance plan should recognize the critical role of public-private partnerships and the principle of beneficiary pays; include alternative revenue sources; and guide investment decisions based on sustainability indicators.
3. California should manage its water resources with ecosystem health and water supply reliability and quality as equal goals, with full consideration of public trust uses whenever feasible.
4. State government should effectively lead, assist, and oversee California's water resources and flood planning and management activities that regions cannot accomplish on their own.
5. State and federal government should lead and support planning, monitoring, and scientific research to help California adapt and mitigate for climate change impacts.
6. California should improve the coordination of land use policies and practices; economic development decisions; and water, flood, and natural resource planning and management.
7. California should renovate and improve its aging water, wastewater, and flood infrastructure.
8. California should articulate and update as needed the roles, authorities, rights, and responsibilities of federal, Tribal, State, and local governments and agencies responsible for water resource and flood planning and management.
9. California should increase public understanding and awareness of where our water comes from as well as the value and importance of water, water quality, and water conservation to people, ecosystems, and California's economy.

The recommendations are as varied as the constraints they are intended to change—institutional, legal, knowledge, information, skills/capacity, resources, funding, schedule, and public awareness.

California needs to act on these recommendations to improve drought contingency planning, make flood management improvements, and adapt to climate change. We need to invest the water and flood bond funds that the public has approved to implement these recommendations and realize this Water Plan.



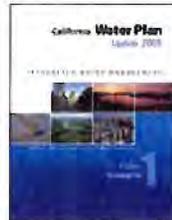
Read more about these policy recommendations in Volume 1 Chapter 2 Imperative to Act. More detailed recommendations for each of the resource management strategies are in Volume 2.

# Navigating Through Water Plan Volumes

California Water Plan Update 2009 presents the latest statewide strategic plan for water management – a roadmap to year 2050. Use this reader’s guide to navigate the many volumes that describe California’s diverse water conditions and statewide and regional integrated water management.

## The Roadmap

*Where are we and how should California proceed?*



## Volume 1 The Strategic Plan

### California Resources

Variable and Extreme

Critical Challenges

- Climate change, population growth, dry years, floods, vulnerable ecosystems and Delta, water quality, aging infrastructure (levees), catastrophic events, data gathering, funding, disadvantaged communities

### Managing our Resources

Sustainability

- Water use efficiency, water quality, stewardship

Reliability

- IRWM, water/flood systems

Reduction of Risk and Uncertainty

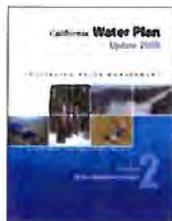
Companion State Plans

Integrated Data and Analysis

Statewide Objectives and Actions

## Options/decision-making

*What can we do?*



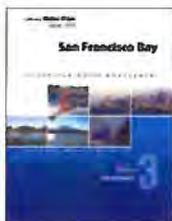
## Volume 2 Resource Management Strategies

### A Range of Choices

27+ management strategies to

- Reduce water demand
- Increase Water Supply
- Improve Water Quality
- Practice Resource Stewardship
- Improve Flood Management

*How does it look and work at the regional level?*



## Volume 3 Regional Reports

10 regions and 2 areas of interest

- Setting
- Water Conditions
- Relations with Other Regions
- Water and Flood Management
- Water Balances
- Looking to the Future
- Scenario Results

## Digging deeper

*Want more on what we know and what we want to know?*



## Volume 4 Reference Guide

An encyclopedic look

- Background on California Water Resources
- Water Resources Analysis
- Emerging Issues

*What's the metadata on the data?*



## Volume 5 Technical Guide

Documentation

- Assumptions
- Data
- Analytical Tools and Methods

The **California Water Plan** provides a framework for resource managers, legislators, Tribes, other decision-makers, and the public to consider options and make decisions regarding California's water future. Our goal is that this document meet Water Code requirements, receive broad support among those participating in California's water planning, and be a useful document. With its partners, DWR completed the final Update 2009 volumes and *Highlights* in December 2009.

The first four volumes of the update and the *Highlights* booklet are contained on the CD attached below. All five volumes of the update and related materials are also available online at  [www.waterplan.water.ca.gov](http://www.waterplan.water.ca.gov).

**Volume 1: The Strategic Plan**

**Volume 2: Resource Management Strategies**

**Volume 3: Regional Reports**

**Volume 4: Reference Guide**

**Volume 5: Technical Guide**

For printed copies of the Highlights, Volume 1, 2, or 3, call 1-916-653-1097.

If you need this publication in alternate form, contact the Public Affairs Office at 1-800-272-8869.

The accompanying CD holds proceedings and other materials from the 2009 California Tribal Water Summit, "Protect Our Sacred Water."

\*\*Insert holder for CD inside of back cover\*\*



**Arnold Schwarzenegger**  
Governor  
State of California

**Lester A. Snow**  
Secretary for Natural Resources  
The Natural Resources Agency

**Mark W. Cowin**  
Director  
Department of Water Resources

## Recycled Water Policy

### 1. *Preamble*

California is facing an unprecedented water crisis.

The collapse of the Bay-Delta ecosystem, climate change, and continuing population growth have combined with a severe drought on the Colorado River and failing levees in the Delta to create a new reality that challenges California's ability to provide the clean water needed for a healthy environment, a healthy population and a healthy economy, both now and in the future.

These challenges also present an unparalleled opportunity for California to move aggressively towards a sustainable water future. The State Water Resources Control Board (State Water Board) declares that we will achieve our mission to "preserve, enhance and restore the quality of California's water resources to the benefit of present and future generations." To achieve that mission, we support and encourage every region in California to develop a salt/nutrient management plan by 2014 that is sustainable on a long-term basis and that provides California with clean, abundant water. These plans shall be consistent with the Department of Water Resources' Bulletin 160, as appropriate, and shall be locally developed, locally controlled and recognize the variability of California's water supplies and the diversity of its waterways. We strongly encourage local and regional water agencies to move toward clean, abundant, local water for California by emphasizing appropriate water recycling, water conservation, and maintenance of supply infrastructure and the use of stormwater (including dry-weather urban runoff) in these plans; these sources of supply are drought-proof, reliable, and minimize our carbon footprint and can be sustained over the long-term.

We declare our independence from relying on the vagaries of annual precipitation and move towards sustainable management of surface waters and groundwater, together with enhanced water conservation, water reuse and the use of stormwater. To this end, we adopt the following goals for California:

- Increase the use of recycled water over 2002 levels by at least one million acre-feet per year (afy) by 2020 and by at least two million afy by 2030.
- Increase the use of stormwater over use in 2007 by at least 500,000 afy by 2020 and by at least one million afy by 2030.
- Increase the amount of water conserved in urban and industrial uses by comparison to 2007 by at least 20 percent by 2020.
- Included in these goals is the substitution of as much recycled water for potable water as possible by 2030.

The purpose of this Policy is to increase the use of recycled water from municipal wastewater sources that meets the definition in Water Code section 13050(n), in a manner that implements state and federal water quality laws. The State Water Board expects to

develop additional policies to encourage the use of stormwater, encourage water conservation, encourage the conjunctive use of surface and groundwater, and improve the use of local water supplies.

When used in compliance with this Policy, Title 22 and all applicable state and federal water quality laws, the State Water Board finds that recycled water is safe for approved uses, and strongly supports recycled water as a safe alternative to potable water for such approved uses.

2. *Purpose of the Policy*

- a. The purpose of this Policy is to provide direction to the Regional Water Quality Control Boards (Regional Water Boards), proponents of recycled water projects, and the public regarding the appropriate criteria to be used by the State Water Board and the Regional Water Boards in issuing permits for recycled water projects.
- b. It is the intent of the State Water Board that all elements of this Policy are to be interpreted in a manner that fully implements state and federal water quality laws and regulations in order to enhance the environment and put the waters of the state to the fullest use of which they are capable.
- c. This Policy describes permitting criteria that are intended to streamline the permitting of the vast majority of recycled water projects. The intent of this streamlined permit process is to expedite the implementation of recycled water projects in a manner that implements state and federal water quality laws while allowing the Regional Water Boards to focus their limited resources on projects that require substantial regulatory review due to unique site-specific conditions.
- d. By prescribing permitting criteria that apply to the vast majority of recycled water projects, it is the State Water Board's intent to maximize consistency in the permitting of recycled water projects in California while also reserving to the Regional Water Boards sufficient authority and flexibility to address site-specific conditions.
- e. The State Water Board will establish additional policies that are intended to assist the State of California in meeting the goals established in the preamble to this Policy for water conservation and the use of stormwater.
- f. For purposes of this Policy, the term "permit" means an order adopted by a Regional Water Board or the State Water Board prescribing requirements for a recycled water project, including but not limited to water recycling requirements, master reclamation permits, and waste discharge requirements.

3. *Benefits of Recycled Water*

The State Water Board finds that the use of recycled water in accordance with this Policy, that is, which supports the sustainable use of groundwater and/or surface water, which is

sufficiently treated so as not to adversely impact public health or the environment and which ideally substitutes for use of potable water, is presumed to have a beneficial impact. Other public agencies are encouraged to use this presumption in evaluating the impacts of recycled water projects on the environment as required by the California Environmental Quality Act (CEQA).

4. *Mandate for the Use of Recycled Water*

- a. The State Water Board and Regional Water Boards will exercise the authority granted to them by the Legislature to the fullest extent possible to encourage the use of recycled water, consistent with state and federal water quality laws.
  - (1) The State Water Board hereby establishes a mandate to increase the use of recycled water in California by 200,000 afy by 2020 and by an additional 300,000 afy by 2030. These mandates shall be achieved through the cooperation and collaboration of the State Water Board, the Regional Water Boards, the environmental community, water purveyors and the operators of publicly owned treatment works. The State Water Board will evaluate progress toward these mandates biennially and review and revise as necessary the implementation provisions of this Policy in 2012 and 2016.
  - (2) Agencies producing recycled water that is available for reuse and not being put to beneficial use shall make that recycled water available to water purveyors for reuse on reasonable terms and conditions. Such terms and conditions may include payment by the water purveyor of a fair and reasonable share of the cost of the recycled water supply and facilities.
  - (3) The State Water Board hereby declares that, pursuant to Water Code sections 13550 *et seq.*, it is a waste and unreasonable use of water for water agencies not to use recycled water when recycled water of adequate quality is available and is not being put to beneficial use, subject to the conditions established in sections 13550 *et seq.* The State Water Board shall exercise its authority pursuant to Water Code section 275 to the fullest extent possible to enforce the mandates of this subparagraph.
- b. These mandates are contingent on the availability of sufficient capital funding for the construction of recycled water projects from private, local, state, and federal sources and assume that the Regional Water Boards will effectively implement regulatory streamlining in accordance with this Policy.
- c. The water industry and the environmental community have agreed jointly to advocate for \$1 billion in state and federal funds over the next five years to fund projects needed to meet the goals and mandates for the use of recycled water established in this Policy.

- d. The State Water Board requests the California Department of Public Health (CDPH), the California Public Utilities Commission (CPUC), and the California Department of Water Resources (CDWR) to use their respective authorities to the fullest extent practicable to assist the State Water Board and the Regional Water Boards in increasing the use of recycled water in California.

5. *Roles of the State Water Board, Regional Water Boards, CDPH and CDWR*

The State Water Board recognizes that it shares jurisdiction over the use of recycled water with the Regional Water Boards and with CDPH. In addition, the State Water Board recognizes that CDWR and the CPUC have important roles to play in encouraging the use of recycled water. The State Water Board believes that it is important to clarify the respective roles of each of these agencies in connection with recycled water projects, as follows:

- a. The State Water Board establishes general policies governing the permitting of recycled water projects consistent with its role of protecting water quality and sustaining water supplies. The State Water Board exercises general oversight over recycled water projects, including review of Regional Water Board permitting practices, and shall lead the effort to meet the recycled water use goals set forth in the Preamble to this Policy. The State Water Board is also charged by statute with developing a general permit for irrigation uses of recycled water.
- b. The CDPH is charged with protection of public health and drinking water supplies and with the development of uniform water recycling criteria appropriate to particular uses of water. Regional Water Boards shall appropriately rely on the expertise of CDPH for the establishment of permit conditions needed to protect human health.
- c. The Regional Water Boards are charged with protection of surface and groundwater resources and with the issuance of permits that implement CDPH recommendations, this Policy, and applicable law and will, pursuant to paragraph 4 of this Policy, use their authority to the fullest extent possible to encourage the use of recycled water.
- d. CDWR is charged with reviewing and, every five years, updating the California Water Plan, including evaluating the quantity of recycled water presently being used and planning for the potential for future uses of recycled water. In undertaking these tasks, CDWR may appropriately rely on urban water management plans and may share the data from those plans with the State Water Board and the Regional Water Boards. CDWR also shares with the State Water Board the authority to allocate and distribute bond funding, which can provide incentives for the use of recycled water.
- e. The CPUC is charged with approving rates and terms of service for the use of recycled water by investor-owned utilities.

6. *Salt/Nutrient Management Plans*

a. *Introduction.*

- (1) Some groundwater basins in the state contain salts and nutrients that exceed or threaten to exceed water quality objectives established in the applicable Water Quality Control Plans (Basin Plans), and not all Basin Plans include adequate implementation procedures for achieving or ensuring compliance with the water quality objectives for salt or nutrients. These conditions can be caused by natural soils/conditions, discharges of waste, irrigation using surface water, groundwater or recycled water and water supply augmentation using surface or recycled water. Regulation of recycled water alone will not address these conditions.
- (2) It is the intent of this Policy that salts and nutrients from all sources be managed on a basin-wide or watershed-wide basis in a manner that ensures attainment of water quality objectives and protection of beneficial uses. The State Water Board finds that the appropriate way to address salt and nutrient issues is through the development of regional or subregional salt and nutrient management plans rather than through imposing requirements solely on individual recycled water projects.

b. *Adoption of Salt/ Nutrient Management Plans.*

- (1) The State Water Board recognizes that, pursuant to the letter dated December 19, 2008 and attached to the Resolution adopting this Policy, the local water and wastewater entities, together with local salt/nutrient contributing stakeholders, will fund locally driven and controlled, collaborative processes open to all stakeholders that will prepare salt and nutrient management plans for each basin/sub-basin in California, including compliance with CEQA and participation by Regional Water Board staff.
  - (a) It is the intent of this Policy for every groundwater basin/sub-basin in California to have a consistent salt/nutrient management plan. The degree of specificity within these plans and the length of these plans will be dependent on a variety of site-specific factors, including but not limited to size and complexity of a basin, source water quality, stormwater recharge, hydrogeology, and aquifer water quality. It is also the intent of the State Water Board that because stormwater is typically lower in nutrients and salts and can augment local water supplies, inclusion of a significant stormwater use and recharge component within the salt/nutrient management plans is critical to the long-term sustainable use of water in California. Inclusion of stormwater recharge is consistent with State Water Board Resolution No. 2005-06, which establishes sustainability as a core value for State Water Board programs and

also assists in implementing Resolution No. 2008-30, which requires sustainable water resources management and is consistent with Objective 3.2 of the State Water Board Strategic Plan Update dated September 2, 2008.

- (b) Salt and nutrient plans shall be tailored to address the water quality concerns in each basin/sub-basin and may include constituents other than salt and nutrients that impact water quality in the basin/sub-basin. Such plans shall address and implement provisions, as appropriate, for all sources of salt and/or nutrients to groundwater basins, including recycled water irrigation projects and groundwater recharge reuse projects.
  - (c) Such plans may be developed or funded pursuant to the provisions of Water Code sections 10750 *et seq.* or other appropriate authority.
  - (d) Salt and nutrient plans shall be completed and proposed to the Regional Water Board within five years from the date of this Policy unless a Regional Water Board finds that the stakeholders are making substantial progress towards completion of a plan. In no case shall the period for the completion of a plan exceed seven years.
  - (e) The requirements of this paragraph shall not apply to areas that have already completed a Regional Water Board approved salt and nutrient plan for a basin, sub-basin, or other regional planning area that is functionally equivalent to paragraph 6(b)3.
  - (f) The plans may, depending upon the local situation, address constituents other than salt and nutrients that adversely affect groundwater quality.
- (2) Within one year of the receipt of a proposed salt and nutrient management plan, the Regional Water Boards shall consider for adoption revised implementation plans, consistent with Water Code section 13242, for those groundwater basins within their regions where water quality objectives for salts or nutrients are being, or are threatening to be, exceeded. The implementation plans shall be based on the salt and nutrient plans required by this Policy.
- (3) Each salt and nutrient management plan shall include the following components:
- (a) A basin/sub-basin wide monitoring plan that includes an appropriate network of monitoring locations. The scale of the basin/sub-basin monitoring plan is dependent upon the site-specific conditions and shall be adequate to provide a reasonable,

cost-effective means of determining whether the concentrations of salt, nutrients, and other constituents of concern as identified in the salt and nutrient plans are consistent with applicable water quality objectives. Salts, nutrients, and the constituents identified in paragraph 6(b)(1)(f) shall be monitored. The frequency of monitoring shall be determined in the salt/nutrient management plan and approved by the Regional Water Board pursuant to paragraph 6(b)(2).

- (i) The monitoring plan must be designed to determine water quality in the basin. The plan must focus on basin water quality near water supply wells and areas proximate to large water recycling projects, particularly groundwater recharge projects. Also, monitoring locations shall, where appropriate, target groundwater and surface waters where groundwater has connectivity with adjacent surface waters.
  - (ii) The preferred approach to monitoring plan development is to collect samples from existing wells if feasible as long as the existing wells are located appropriately to determine water quality throughout the most critical areas of the basin.
  - (iii) The monitoring plan shall identify those stakeholders responsible for conducting, compiling, and reporting the monitoring data. The data shall be reported to the Regional Water Board at least every three years.
- (b) A provision for annual monitoring of Emerging Constituents/ Constituents of Emerging Concern (e.g., endocrine disrupters, personal care products or pharmaceuticals) (CECs) consistent with recommendations by CDPH and consistent with any actions by the State Water Board taken pursuant to paragraph 10(b) of this Policy.
  - (c) Water recycling and stormwater recharge/use goals and objectives.
  - (d) Salt and nutrient source identification, basin/sub-basin assimilative capacity and loading estimates, together with fate and transport of salts and nutrients.
  - (e) Implementation measures to manage salt and nutrient loading in the basin on a sustainable basis.
  - (f) An antidegradation analysis demonstrating that the projects included within the plan will, collectively, satisfy the requirements of Resolution No. 68-16.

- (4) Nothing in this Policy shall prevent stakeholders from developing a plan that is more protective of water quality than applicable standards in the Basin Plan. No Regional Water Board, however, shall seek to modify Basin Plan objectives without full compliance with the process for such modification as established by existing law.

7. *Landscape Irrigation Projects*

- a. *Control of incidental runoff.* Incidental runoff is defined as unintended small amounts (volume) of runoff from recycled water use areas, such as unintended, minimal over-spray from sprinklers that escapes the recycled water use area. Water leaving a recycled water use area is not considered incidental if it is part of the facility design, if it is due to excessive application, if it is due to intentional overflow or application, or if it is due to negligence. Incidental runoff may be regulated by waste discharge requirements or, where necessary, waste discharge requirements that serve as a National Pollutant Discharge Elimination System (NPDES) permit, including municipal separate storm water system permits, but regardless of the regulatory instrument, the project shall include, but is not limited to, the following practices:

- (1) Implementation of an operations and management plan that may apply to multiple sites and provides for detection of leaks, (for example, from broken sprinkler heads), and correction either within 72 hours of learning of the runoff, or prior to the release of 1,000 gallons, whichever occurs first,
- (2) Proper design and aim of sprinkler heads,
- (3) Refraining from application during precipitation events, and
- (4) Management of any ponds containing recycled water such that no discharge occurs unless the discharge is a result of a 25-year, 24-hour storm event or greater, and there is notification of the appropriate Regional Water Board Executive Officer of the discharge.

- b. *Streamlined Permitting*

- (1) The Regional Water Boards shall, absent unusual circumstances (i.e., unique, site-specific conditions such as where recycled water is proposed to be used for irrigation over high transmissivity soils over a shallow (5' or less) high quality groundwater aquifer), permit recycled water projects that meet the criteria set forth in this Policy, consistent with the provisions of this paragraph.
- (2) If the Regional Water Board determines that unusual circumstances apply, the Regional Water Board shall make a finding of unusual circumstances based on substantial evidence in the record, after public notice and hearing.

- (3) Projects meeting the criteria set forth below and eligible for enrollment under requirements established in a general order shall be enrolled by the State or Regional Water Board within 60 days from the date on which an application is deemed complete by the State or Regional Water Board. For projects that are not enrolled in a general order, the Regional Water Board shall consider permit adoption within 120 days from the date on which the application is deemed complete by the Regional Water Board.
  - (4) Landscape irrigation projects that qualify for streamlined permitting shall not be required to include a project specific receiving water and groundwater monitoring component unless such project specific monitoring is required under the adopted salt/nutrient management plan. During the interim while the salt management plan is under development, a landscape irrigation project proponent can either perform project specific monitoring, or actively participate in the development and implementation of a salt/nutrient management plan, including basin/sub-basin monitoring. Permits or requirements for landscape irrigation projects shall include, in addition to any other appropriate recycled water monitoring requirements, recycled water monitoring for CECs on an annual basis and priority pollutants on a twice annual basis. Except as requested by CDPH, State and Regional Water Board monitoring requirements for CECs shall not take effect until 18 months after the effective date of this Policy. In addition, any permits shall include a permit reopener to allow incorporation of appropriate monitoring requirements for CECs after State Water Board action under paragraph 10(b)(2).
  - (5) It is the intent of the State Water Board that the general permit for landscape irrigation projects be consistent with the terms of this Policy.
- c. *Criteria for streamlined permitting.* Irrigation projects using recycled water that meet the following criteria are eligible for streamlined permitting, and, if otherwise in compliance with applicable laws, shall be approved absent unusual circumstances:
- (1) Compliance with the requirements for recycled water established in Title 22 of the California Code of Regulations, including the requirements for treatment and use area restrictions, together with any other recommendations by CDPH pursuant to Water Code section 13523.
  - (2) Application in amounts and at rates as needed for the landscape (i.e., at agronomic rates and not when the soil is saturated). Each irrigation project shall be subject to an operations and management plan, that may apply to multiple sites, provided to the Regional Water Board that specifies the agronomic rate(s) and describes a set of reasonably practicable measures to ensure compliance with this requirement, which may include the development of water budgets for use areas, site

supervisor training, periodic inspections, tiered rate structures, the use of smart controllers, or other appropriate measures.

- (3) Compliance with any applicable salt and nutrient management plan.
- (4) Appropriate use of fertilizers that takes into account the nutrient levels in the recycled water. Recycled water producers shall monitor and communicate to the users the nutrient levels in their recycled water.

8. *Recycled Water Groundwater Recharge Projects*

- a. The State Water Board acknowledges that all recycled water groundwater recharge projects must be reviewed and permitted on a site-specific basis, and so such projects will require project-by-project review.
- b. Approved groundwater recharge projects will meet the following criteria:
  - (1) Compliance with regulations adopted by CDPH for groundwater recharge projects or, in the interim until such regulations are approved, CDPH's recommendations pursuant to Water Code section 13523 for the project (e.g., level of treatment, retention time, setback distance, source control, monitoring program, etc.).
  - (2) Implementation of a monitoring program for constituents of concern and a monitoring program for CECs that is consistent with any actions by the State Water Board taken pursuant to paragraph 10(b) of this Policy and that takes into account site-specific conditions. Groundwater recharge projects shall include monitoring of recycled water for CECs on an annual basis and priority pollutants on a twice annual basis.
- c. Nothing in this paragraph shall be construed to limit the authority of a Regional Water Board to protect designated beneficial uses, *provided* that any proposed limitations for the protection of public health may only be imposed following regular consultation by the Regional Water Board with CDPH, consistent with State Water Board Orders WQ 2005-0007 and 2006-0001.
- d. Nothing in this Policy shall be construed to prevent a Regional Water Board from imposing additional requirements for a proposed recharge project that has a substantial adverse effect on the fate and transport of a contaminant plume or changes the geochemistry of an aquifer thereby causing the dissolution of constituents, such as arsenic, from the geologic formation into groundwater.
- e. Projects that utilize surface spreading to recharge groundwater with recycled water treated by reverse osmosis shall be permitted by a Regional Water Board within one year of receipt of recommendations from CDPH. Furthermore, the Regional Water Board shall give a high priority to review and approval of such projects.

9. *Antidegradation*

- a. The State Water Board adopted Resolution No. 68-16 as a policy statement to implement the Legislature's intent that waters of the state shall be regulated to achieve the highest water quality consistent with the maximum benefit to the people of the state.
- b. Activities involving the disposal of waste that could impact high quality waters are required to implement best practicable treatment or control of the discharge necessary to ensure that pollution or nuisance will not occur, and the highest water quality consistent with the maximum benefit to the people of the state will be maintained.
- c. Groundwater recharge with recycled water for later extraction and use in accordance with this Policy and state and federal water quality law is to the benefit of the people of the state of California. Nonetheless, the State Water Board finds that groundwater recharge projects using recycled water have the potential to lower water quality within a basin. The proponent of a groundwater recharge project must demonstrate compliance with Resolution No. 68-16. Until such time as a salt/nutrient management plan is in effect, such compliance may be demonstrated as follows:
  - (1) A project that utilizes less than 10 percent of the available assimilative capacity in a basin/sub-basin (or multiple projects utilizing less than 20 percent of the available assimilative capacity in a basin/sub-basin) need only conduct an antidegradation analysis verifying the use of the assimilative capacity. For those basins/sub-basins where the Regional Water Boards have not determined the baseline assimilative capacity, the baseline assimilative capacity shall be calculated by the initial project proponent, with review and approval by the Regional Water Board, until such time as the salt/nutrient plan is approved by the Regional Water Board and is in effect. For compliance with this subparagraph, the available assimilative capacity shall be calculated by comparing the mineral water quality objective with the average concentration of the basin/sub-basin, either over the most recent five years of data available or using a data set approved by the Regional Water Board Executive Officer. In determining whether the available assimilative capacity will be exceeded by the project or projects, the Regional Water Board shall calculate the impacts of the project or projects over at least a ten year time frame.

- (2) In the event a project or multiple projects utilize more than the fraction of the assimilative capacity designated in subparagraph (1), then a Regional Water Board-deemed acceptable antidegradation analysis shall be performed to comply with Resolution No. 68-16. The project proponent shall provide sufficient information for the Regional Water Board to make this determination. An example of an approved method is the method used by the State Water Board in connection with Resolution No. 2004-0060 and the Regional Water Board in connection with Resolution No. R8-2004-0001. An integrated approach (using surface water, groundwater, recycled water, stormwater, pollution prevention, water conservation, etc.) to the implementation of Resolution No. 68-16 is encouraged.
- d. Landscape irrigation with recycled water in accordance with this Policy is to the benefit of the people of the State of California. Nonetheless, the State Water Board finds that the use of water for irrigation may, regardless of its source, collectively affect groundwater quality over time. The State Water Board intends to address these impacts in part through the development of salt/nutrient management plans described in paragraph 6.
- (1) A project that meets the criteria for a streamlined irrigation permit and is within a basin where a salt/nutrient management plan satisfying the provisions of paragraph 6(b) is in place may be approved without further antidegradation analysis, provided that the project is consistent with that plan.
  - (2) A project that meets the criteria for a streamlined irrigation permit and is within a basin where a salt/nutrient management plan satisfying the provisions of paragraph 6(b) is being prepared may be approved by the Regional Water Board by demonstrating through a salt/nutrient mass balance or similar analysis that the project uses less than 10 percent of the available assimilative capacity as estimated by the project proponent in a basin/sub-basin (or multiple projects using less than 20 percent of the available assimilative capacity as estimated by the project proponent in a groundwater basin).
10. *Emerging Constituents/Chemicals of Emerging Concern*
- a. *General Provisions*
    - (1) Regulatory requirements for recycled water shall be based on the best available peer-reviewed science. In addition, all uses of recycled water must meet conditions set by CDPH.
    - (2) Knowledge of risks will change over time and recycled water projects must meet legally applicable criteria. However, when standards change, projects should be allowed time to comply through a compliance schedule.

- (3) The state of knowledge regarding CECs is incomplete. There needs to be additional research and development of analytical methods and surrogates to determine potential environmental and public health impacts. Agencies should minimize the likelihood of CECs impacting human health and the environment by means of source control and/or pollution prevention programs.
  - (4) Regulating most CECs will require significant work to develop test methods and more specific determinations as to how and at what level CECs impact public health or our environment.
- b. *Research Program.* The State Water Board, in consultation with CDPH and within 90 days of the adoption of this Policy, shall convene a “blue-ribbon” advisory panel to guide future actions relating to constituents of emerging concern.
- (1) The panel shall be actively managed by the State Water Board and shall be composed of at least the following: one human health toxicologist, one environmental toxicologist, one epidemiologist, one biochemist, one civil engineer familiar with the design and construction of recycled water treatment facilities, and one chemist familiar with the design and operation of advanced laboratory methods for the detection of emerging constituents. Each of these panelists shall have extensive experience as a principal investigator in their respective areas of expertise.
  - (2) The panel shall review the scientific literature and, within one year from its appointment, shall submit a report to the State Water Board and CDPH describing the current state of scientific knowledge regarding the risks of emerging constituents to public health and the environment. Within six months of receipt of the panel’s report the State Water Board, in coordination with CDPH, shall hold a public hearing to consider recommendations from staff and shall endorse the recommendations, as appropriate, after making any necessary modifications. The panel or a similarly constituted panel shall update this report every five years.
  - (3) Each report shall recommend actions that the State of California should take to improve our understanding of emerging constituents and, as may be appropriate, to protect public health and the environment.
  - (4) The panel report shall answer the following questions: What are the appropriate constituents to be monitored in recycled water, including analytical methods and method detection limits? What is the known toxicological information for the above constituents? Would the above lists change based on level of treatment and use? If so, how? What are possible indicators that represent a suite of CECs? What levels of CECs should trigger enhanced monitoring of CECs in recycled water, groundwater and/or surface waters?

- c. *Permit Provisions.* Permits for recycled water projects shall be consistent both with any CDPH recommendations to protect public health and with any actions by the State Water Board taken pursuant to paragraph 10(b)(2).

11. *Incentives for the Use of Recycled Water*

- a. *Funding*

The State Water Board will request CDWR to provide funding (\$20M) for the development of salt and nutrient management plans during the next three years (i.e., before FY 2010/2011). The State Water Board will also request CDWR to provide priority funding for projects that have major recycling components; particularly those that decrease demand on potable water supplies. The State Water Board will also request priority funding for stormwater recharge projects that augment local water supplies. The State Water Board shall promote the use of the State Revolving Fund (SRF) for water purveyor, stormwater agencies, and water recyclers to use for water reuse and stormwater use and recharge projects.

- b. *Stormwater*

The State Water Board strongly encourages all water purveyors to provide financial incentives for water recycling and stormwater recharge and reuse projects. The State Water Board also encourages the Regional Water Boards to require less stringent monitoring and regulatory requirements for stormwater treatment and use projects than for projects involving untreated stormwater discharges.

- c. *TMDLs*

Water recycling reduces mass loadings from municipal wastewater sources to impaired waters. As such, waste load allocations shall be assigned as appropriate by the Regional Water Boards in a manner that provides an incentive for greater water recycling.